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ENROLLMENT OF VETERINARY STUDENTS

THE REGISTRATION of veterinary students in colleges in the United States and Canada for the college year 1921-1922. shown in the following table, has some encouraging features. The downward trend of the last few years, though not yet absolutely arrested, is at least partially checked, and there seems to be ground for the hope that the turning point is near at hand.

The number of freshmen enrolled for the current year is but 10 below the number for the preceding year, while the decrease from 1919-20 to 1920-21 was 188. The total decline of 176 is due largely to the disparity between the senior classes of the two years. If, however, we compare this year's senior registration with the number of last year's juniors, as should be done in order to see the situation in its true perspective, we observe that there are nine more seniors this year than there were juniors last year. The shrinkage between the lower classes of 1920-21 and the next higher classes of 1921-22 is much less than between 1919-20 and 1920-21.

	Freshmen	Sophomores	Juniors	Seniors	Specials	Totals 21-22	Totals 20-21
Alabama	10	5	14	12	.....	41	48
Colorado	18	15	17	17	1	68	82
Georgia	2	4	5	2	8	21	21
Indiana	10	13	21	25	.....	69	137
Iowa	26	17	18	19	.....	80	94
Kansas	10	13	22	10	4	59	71
Michigan	11	6	6	6	1	30	21
N. Y. State (N. Y. U.)	5	0	2	5	2	14	23
N. Y. State (Cornell)	14	17	27	17	.....	75	75
North Dakota [1]	3	3	.....	.....	.....	6	6
Ohio	14	13	25	35	.....	87	106
Oklahoma [1]	2	.....	.....	.....	.....	2	4
Ontario, Canada	13	22	35	18	.....	88	88
Pennsylvania	11	5	8	7	.....	31	30
St. Joseph	8	12	35	19	.....	74	102
Texas	5	1	2	4	.....	12	14
United States	3	4	9	4	.....	20	30
Washington State	7	2	7	6	.....	22	23
Totals	172	152	253	206	16	799	975
Totals 1920-21	182	281	197	296	9	.....	975

[1] Agricultural colleges giving two years in veterinary medicine. North Carolina has no students this session.

THE VETERINARIAN AND PUBLIC HEALTH

"THE Veterinarian Contributes to Public Health" is the title of an interesting article by J. Howard Beard, M. D., University of Illinois Health Service, which appeared in the June 15 issue of the popular publication, *The Nation's Health.*

In this article Dr. Beard discusses tuberculosis, anthrax, rabies, foot-and-mouth disease, milk sickness, pyogenic infections, endoparasitic infestations, and other diseases to which man and animals are alike susceptible. An interesting statement refers to the relation of veterinarians to the physicians, whom Dr. Beard designates as "allies in scientific research." The following quotations are from the article in *The Nation's Health:*

"Man domesticated the horse, the cow, the goat, the sheep, and the hog, which have fed and clothed and, in the case of the horse and ox, have borne him from place to place. They have broken and fertilized the soil which has grown grains, vegetables, and fruits more abundantly. Yet these noble animals, when ill, have proved to be the worst enemies of man. They have destroyed him with tuberculosis, killed him with anthrax, cut him off with glanders, filled his muscles with trichinæ,

racked his body with Malta fever, and loaded his intestines with tapeworms. They may become so dangerous to him when infected with anthrax that their meat, milk, hides, hair, or bristles may cause his death.

"That man should have some of the roses and avoid the thorns, that these best friends should feed and clothe him today and not destroy him tomorrow, is the contribution of the veterinary surgeon to public health. In his efforts to protect and to save animals, the veterinarian has consciously and unsuspectedly pointed to hidden paths by which man has been able to attain an average life nearer the normal limit of three score and ten. * * *

"The veterinary surgeon has contributed to public health by caring for animals infected with diseases which occur primarily in man; secondarily in animals. Both cattle and hogs may contract human tuberculosis and later transmit it to man. Cowpox and horsepox have been known for centuries. They probably originated with man and, according to many expert opinions, are modified variola or smallpox. In 1796, Jenner showed they are capable of producing an immunity to smallpox when inoculated in man. While the veterinarian has rendered distinct service in controlling these diseases in animals, in the case of man, more accidental inoculations would reduce smallpox among the unvaccinated without subjecting them to the danger of disfigurement of variola. * * *

"Veterinary science advances public health by stamping out endoparasitic diseases in livestock and in domestic animals, for which man may be the accidental, intermediary, or the only host. The more important internal parasites from the standpoint of public health are trichina, *Taenia solium*, *T. saginata* and *T. echinococcus*. * * *

"Discoveries in the field of veterinary science, with rare exceptions, have been helpful in the domain of medicine. Study of splenic fever in cattle and the demonstration of the relation of the tick to its transmission gave a new conception of the role of insects in the spread of disease and blazed the way for a better understanding of Rocky Mountain spotted fever, relapsing and South African tick fever in man. Investigation of surra in horses and nagana in cattle offered fertile suggestion in the study of human trypanosomiasis. Pasteur's immunization of chickens

against cholera and cattle and sheep against anthrax are the forerunners of inoculation against typhoid fever, cholera and plague. The world owes a great deal to the milkmaid who told the medical student, Edward Jenner, 'I can not take smallpox because I have had cowpox.' Her information led to the discovery of vaccination which has saved millions of human beings from death or disfigurement. Incidentally it reduces the cases of cowpox among domestic animals.

"The study of malnutrition, and its treatment in livestock and fowl has proved very helpful in dealing with scurvy, pellagra, rickets, and beriberi, and metabolic disease in man. Progress in animal feeding has usually created new possibilities for the better nutrition of man. Investigations of tumors in animals have shed additional light upon cancer.

"The veterinarian's work with young animals has aided the pediatrician in feeding and caring for infants. Treatment of abnormal parturition and of post-partum illness in animals has in many instances offered helpful hints to the obstetrician which have extended the boundaries of his subject and resulted in throwing greater safeguards around childbirth.

"In the battle against disease, the veterinarian and the physician are complements and allies. The former strives to prevent sickness among animals and to protect man; the latter seeks to preserve the health of man and incidentally saves animals. The one alleviates the sufferings of noble brutes; the other brings relief to his fellows. Both covet the glorious title of benefactor of humanity."

Although veterinary medicine is yet in its infancy compared with human medicine, its important achievements in the field of research have ressulted to the advantage of all concerned in establishing a relationship of mutual respect and confidence between scientific investigators in these allied fields of usefulness. When we pause to consider the intimate relationship between animal and human maladies, it seems strange that there has not developed more rapidly a better understanding and closer working relation between practitioners in human and veterinary medicine. There is no doubt that they could be of mutual assistance in practice if a closer contact were established.

The essential contact between veterinary and human practitioners is possible through existing associations and popular sci-

entific publications. Medical and veterinary associations now hold meetings at regular intervals, but there has been little effort on the part of either to encourage affiliation. Seldom do physicians attend veterinary conferences and rarely do the names of veterinarians appear on the programs of the meetings of medical associations. It is true that several veterinarians are members of and not infrequently take part in the programs of the American Public Health Association, Society of American Bacteriologists, National Association for the Prevention of Tuberculosis, Society of Experimental Medicine and Biology, American Association for the Advancement of Science and similar organizations that welcome veterinarians to their meetings, but unfortunately too few of them avail themselves of such opportunities. It would be beneficial to both professions and to their clientele if the larger medical and veterinary associations were to include in their programs a short period for the discussion by physicians and veterinarians of subjects that are of mutual interest. It is hoped that the A. V. M. A. will be one of the first to make a move in this direction and adopt such a policy, not for any one year, but for each annual convention.

Dr. Beard is to be complimented on his splendid article and it is hoped that more such valuable contributions from physicians and veterinarians will appear in publications devoted to problems relating to disease, health and sanitation.

The Veterinary Journal (British) has reprinted in full, with extended favorable editorial comment, the paper by Dr. David S. White on "Our Profession," which appeared in our pages in April, 1921.

The average man would rather put on the regalia of some order and be known as the supreme grand hoozis than to know the contents of an encyclopedia or be a Ph. D.—*Journal of the American Medical Association.*

The Scottish Farmer reviews approvingly what it characterizes as "a humorous, striking, and essentially American circular," issued by the Horse Association of America, which "effectively upsets the theory that the horse is doomed by the increasing use of motor power."

BUREAU OF ANIMAL INDUSTRY INVESTIGATIONS ON BOVINE INFECTIOUS ABORTION[1]

By E. C. SCHROEDER

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MY TASK is a discussion of the investigations of the Federal Bureau of Animal Industry on the common and widespread evil known as bovine infectious abortion. As the investigations have been long in progress and quite active in recent years, it may be well to say in advance that it will be impossible in the time at my disposal to enter into minute detail concerning them. And probably it is fair to assume that a minutely detailed account of the arduous, time-consuming and patience-trying technical work that has been done would prove less interesting or useful than a simple presentation of the facts that have been revealed or confirmed, together with a reference to their economic significance, provided enough is said about the evidence on which they are based to show that they are facts in reality and not merely in name.

Efforts to control infectious diseases before their etiology is known, at best, are general and commonly as unpromising as the chances that a marksman, with a vague idea of the direction in which he should aim, will make an effective shot in the dark. If enough ammunition is burned a lucky hit is occasionally made, but usually the ammunition is burned in vain, and the noise, smoke and confusion, even if stray shots do not prove unintentionally destructive, profit and please no one. What the marksman needs is light, and the light needed to combat infectious diseases is a reasonably clear knowledge of their etiology.

The prime etiological factor of bovine infectious abortion was discovered by Bang and Stribolt long before the more active investigation of the evil was undertaken by the Bureau of Animal Industry, and the discovery had been confirmed by McFadyean and Stockman in England, and MacNeal and Kerr and Ward Giltner and Good in America. But etiology is more than the recognition of the causative microparasite of a disease, and it remained to be determined how and when the parasite, the Bang

[1] Presented at the twenty-fifth annual meeting of the United States Livestock Sanitary Association, Chicago, Ill., Nov. 29-30, 1921.

bacillus, enters and leaves the bodies of its hosts or victims; whether it occurs elsewhere in nature than in the bodies of its victims; on what natural conditions its multiplication and perpetuation depend, etc., etc. Though some of the facts were known, so much remained in doubt that the available data led to wholly contradictory conclusions and fruitless controversies, and consequently when the question was asked, "How shall we combat abortion disease?" the answers ranged from a modest "I don't know" to suggested flushings and douchings that were apt to cost more per animal than the value of ordinary cattle per head, and the enactment of stringent laws and regulations which would have been more annoying and expensive to cattle owners than beneficial to their herds.

Confronted with this uncertainty and confusion, it required no prophet to foresee that an investigation of bovine infectious abortion would fail of its purpose unless vigorous efforts were made to amplify and clarify the existing etiological knowledge of the disease, and therefore etiological studies were at once planned and undertaken. An abundance of work also was done relative to treatment, general as well as specific; but I will speak of the etiological investigations first.

THE OCCURRENCE OF THE BANG BACILLUS IN THE BODIES OF CATTLE

The Bang abortion bacillus, like the tubercle bacillus, evidently is an obligatory parasite; it is known to multiply nowhere in nature but in the bodies of its hosts. In culture tubes, carefully sealed to prevent drying, it has been kept alive in the Bureau laboratories nearly three years; and in placentas of aborting cows, exposed under fly screens in shaded places in the woods during the colder months of the year, it has remained alive, in rare instances, as long as four months. In material discharged from the bodies of aborting cows, unless the conditions are exceptionally favorable for its preservation, the bacillus generally dies in less than a month, and its death is greatly hastened by sunlight. The weak resistance of the nonsporulating microparasite against natural germicidal forces implied that it could not perpetuate itself and serve as the cause of a widespread plague unless some special provision had been made by nature for its preservation, and the most reasonable provision

to look for was its long-continued presence in a dormant or a partly dormant state in the bodies of its hosts.

It was known that the bacillus occurs in the placentas of aborting cows and in different portions of the bodies of aborted fetuses. The investigations of McFadyean and Stockman indicated that it disappeared from the uterus within approximately a month after an abortion. The discovery had been made independently by the Bureau and by Smith and Fabyan that it occurs in the udders and milk of some infected cows. It remained to be determined how long it persists in the udder and, more definitely, how long it persists in the uterus and other portions of the reproductive organs. It remained to be determined whether it occurs in other parts of the body than the reproductive organs and the udder, and what its presence in other parts of the body signified. It also remained to be determined whether it occurs in the bodies of calves, heifers and bulls.

Today we know that the Bang abortion bacillus may, in rare cases, persist in the uterus two months after an abortion or a parturition, but that, as a rule, it does not persist more than two to three weeks; that it may persist in the udder and milk for greatly varying periods of time, from a few weeks to six or seven years; that the udders of more than 60 per cent of infected cows at some time harbor the bacillus; that when it is present in the udder it invades the uterus in a large proportion of cases during pregnancy and may be very abundant though the pregnancy is seemingly normal and ends in an apparently normal parturition; that it occasionally attacks and can be found in the reproductive organs and seminal fluid of bulls; that it may be present in the stomach fluids, livers and gastro-hepatic lymph glands of newly born, viable calves, and that all attempts to find it in the bodies of cows elsewhere than their udders, their uteruses during gestation and shortly after an abortion or a parturition, and the lymph glands associated with these organs, have failed.

It does not require much time or many words to state these facts. How much work was required to secure them may be evident to practical investigators, and even they are apt to fall short in their estimates. For example, the short statement that "abortion bacilli occur in the bodies of newly born, viable calves" rests on tests in which eleven calves were used, as follows: The calves were removed from their mothers, abortion-

infected cows, immediately after delivery, and not permitted to have access to anything that could lead to the postpartum ingestion of infected material; they were killed and sectioned with strict aseptic precautions, and tissues were gathered from all parts of their bodies for cultural and animal inoculation tests, and later, when positive results were obtained, they were confirmed by the subinoculation of experiment animals and culture tubes. If positive results had been obtained with the first two or three calves it would have settled the matter; but this was not the case; and when the results are negative the number of animals examined must be multiplied before the evidence is sufficient to give reasonable stability to a conclusion based on it. So with the brief statement that the abortion bacillus occurs nowhere in the bodies of cows but in their udders, pregnant or recently pregnant uteruses and associated lymph glands. The Bureau investigators who obtained the data that prove this statement can tell about the arduous task it was to kill and section abortion-infected cows so that their blood, spleens, livers, lungs, kidneys, serous membranes, synovial fluid, bone marrow, brains, spinal cords, muscles, uteruses, vaginas, Fallopian tubes, ovaries, etc., and lymph glands from all portions of their bodies could be tested. Not one or two cows, but a good many of them, because negative results require that the number of subjects examined must be large enough to insure that the exception which often is supposed to prove the rule has been eliminated.

Regarding the calves found to harbor abortion bacilli at birth—two out of eleven examined—it is noteworthy that one was the offspring of a cow that has never aborted and was recognized as a carrier and spreader of abortion bacilli only through the use of biological tests.

The examination of the bodies of calves for abortion bacilli was not confined to the eleven newly born calves, because the discovery that viable calves may harbor abortion bacilli at birth made it important to determine how long the calves of infected cows may remain carriers of the bacillus, particularly as the untenable hypothesis that "abortion bacilli may lie dormant in the bodies of cattle from birth until sexual maturity and then cause abortions" had been widely promulgated.

We know now, as the result of a large number of tests, that young cattle rarely harbor abortion bacilli in their bodies, and that, when they do so, they react to abortion tests. Many

calves react to such tests during the first weeks of their lives, but the reactions rapidly decline and disappear even if the calves are suckled by dams with infected udders, and, if they are protected against exposure to abortion infection after they are weaned, they become normal, healthy producers of calves when they reach sexual maturity.

As far as the Bureau's work has gone, the calves of abortion-infected cows, irrespective of whether they did or did not react to abortion tests during the first weeks of their lives, and irrespective of whether they were suckled by cows with clean or with infected udders, if they are protected against infection after they are weaned, are neither more nor less susceptible to abortion disease when they reach maturity than the calves of normal cows. This would indicate, if herd immunity against abortion disease actually develops, that it is less due to anything that calves inherit from their dams or acquire by ingesting infected milk during the milk-drinking periods of their lives, than to a fairly continuous exposure to abortion bacilli from birth until maturity, and possibly to their exposure particularly during the last two to three months before conception.

The significance of the exposure of cattle to infection with abortion bacilli during presexual life is a line of work that was greatly hampered by lack of funds. It was planned and well under way before our country entered the war. What happened to the cost of labor and feed after the war was entered is too well known to require discussion here, and what effect this had on the Bureau's experimental investigations may be judged when it is known that the appropriations made for them did not take the reduced purchasing value of money into account. Work requiring a certain number of animals, planned when hay was plentiful at $20 a ton and other forage equally cheap, was impossible without greatly increased funds when hay was scarce at $40 a ton and other forage had increased proportionately in cost. The Bureau had no choice; it would have preferred to retain all its experiment animals and to continue its investigations undisturbed, but the pecuniary obstacles were too great to be mastered by scientific enthusiasm, and so it was forced to resort to painfully severe retrenchment. Many animals that had acquired great value because of the treatment to which they had been subjected and because their origin and history were fully known, and which it was desirable to keep

under observation, had to be disposed of, and, though no one was really to blame, the sorrow and regret this caused will not soon be forgotten.

The work on which the conclusion is based that the nonpregnant uterus is not a habitat of the abortion bacillus is somewhat varied in character. The first tests dealt with infected cows that had aborted or given birth to calves. Beginning directly after the abortion or the parturition, material was collected periodically on sterile swabs from the uteruses of such cows, and studied for the presence of abortion bacilli. The studies showed—and the number made cannot be stated in dozens and scores, as they amount to many hundreds—that abortion bacilli as a rule disappear from the uterus in which they were abundant at the time of an abortion or a parturition in from two to three weeks, though occasionally they persist somewhat longer and in exceedingly rare instances as long as nearly two months.

The second line of tests concerned cows into the uteruses of which cultures of abortion bacilli had been injected; the third, cows that were killed and all portions of their uteruses tested for abortion bacilli possibly hidden beneath the surface; and the fourth, cows that received copious intravenous injections of abortion bacilli and the uteruses of which were studied during subsequent estrual periods.

It was reasonable to conclude, though abortion bacilli could not be collected from a uterus on a cotton swab, that they might be present in or beneath the mucous membrane, or somewhere in the cotyledons, Fallopian tubes or ovaries, but this did not prove to be the case. Likewise, since the pregnant uterus is the favorite habitat of the bacillus, it was reasonable to believe that special activity of the reproductive organs would better enable it to maintain itself in the uterus, and that, therefore, the estrual period deserved special attention. It is fortunate that this period does not help the bacillus to live and multiply in the uterus, because, if it did, we would be forced to conclude that all cows with infected udders are prolific disseminators of abortion bacilli via their vaginas during a number of days every month.

The discovery that bulls may harbor abortion bacilli in their reproductive organs is also the product of industrious application; that is to say, it was not a fortunate stumbling on a fact.

As the belief was widely entertained that infectious abortion is carried from cow to cow by the bull, and that he introduces it at the time of copulation directly into the uterus, it was desirable to determine on what part of his sexual organs the bacilli occurred and how long they remained virulent. Hence, material was collected from many bulls shortly after they had served cows that reacted to abortion tests and were known to have infected udders, and this material was tested for abortion bacilli. The results in every case were negative, and it was found that the bacilli did not survive long even when pure cultures were introduced into the bull's sheath. This work was followed by postmortem examinations of reacting bulls, and with tests of all portions of their bodies for abortion bacilli in the manner in which the bodies of reacting cows had been tested, and the organism was finally discovered in an epididymal abscess.

Since then a number of bulls have been artificially infected with abortion bacilli, and studies have been made relative to the frequency with which bulls react to abortion tests, and the frequency with which lesions chargeable to abortion bacilli occur in the reproductive organs of reacting bulls; also studies which conclusively proved that bulls with infected reproductive organs may expel abortion bacilli with their seminal fluid.

The studies on the frequency with which bulls react to abortion tests dealt with several hundred bulls sent to an abattoir near Washington for slaughter. The bulls were first tested, and then, if they reacted, their genital organs were obtained and examined for lesions and abortion bacilli. Approximately 10 per cent of the bulls tested reacted, and approximately 10 per cent of the reacting bulls showed lesions of the reproductive organs from which abortion bacilli were isolated. The value of these studies is not that they give us a measure of the proportion of bulls that react positively to abortion tests or the proportion of reacting bulls that are carriers of abortion bacilli. The number of bulls tested, about 325, is too small to serve this purpose, to say nothing of the fact that bulls removed from herds and sent to the butcher are not representatives of those retained in herds to serve cows. Their value lies in the fact that they show that abortion bacillus disease of the bull's reproductive organs is not a wholly unique affection which practically may

be ignored, but an important condition that must be taken seriously into account in our efforts to combat infectious abortion, since it has been proved to be associated with the contamination of the seminal fluid.

MODES OF DISSEMINATION

Precise knowledge of the habitat of a parasite in the body of its host aids greatly in determining how it gets out of one host and into another; or, in other words, if the parasite is a pathogenic microorganism, how the disease it causes spreads from victim to victim.

The knowledge that the abortion parasite lodges nowhere in the living bodies of cattle but the udders and pregnant and recently pregnant uteruses of cows, the reproductive organs of bulls, and the digestive tracts and livers of newly born calves, and the lymph glands more or less intimately associated with the named organs, at once calls attention to the channels through which it is expelled.

From the udder the bacillus is expelled through the teat with milk, from the uterus with aborted fetuses, the placentas and discharges following an abortion or a parturition, and from the sexual organs of bulls with seminal fluid and other discharges. These three modes of expulsion have been definitely proved, and no doubt can be entertained about them. That the bacillus also may be expelled with the alvine discharges of infected calves and calves that drink infected milk seems probable but has not been definitely proved. It is a question on which experimental studies have been made, but the data obtained are not sufficient to justify a final answer. But, even if the answer eventually is affirmative, this mode of dissemination could hardly be characterized as important, as it would be confined to calves with infected mothers and would be closely limited to the time when the mothers are more or less actively expelling infected material from their uteruses.

The udder becomes infected in upward of 60 per cent of all infected cows, and the time during which it remains infected varies from a few weeks to six or seven years. An important fact about cows with infected udders is that in a large proportion of cases the infection extends to the uterus during gestation. Among the cows with infected udders thus far examined about

one-half were proved to harbor abortion bacilli in their uteruses at the time of parturition.

An infected udder does not mean that a cow has aborted or will abort, or that she has shown or will show symptoms of abortion disease, but it does mean that she is a dangerous animal to introduce into an abortion-free herd of cattle. Fortunately, after having made hundreds of tests, Bureau investigators have not yet found a cow with an abortion-infected udder that did not react in an unmistakable manner to the agglutination and complement-fixation tests for bovine infectious abortion.

The expulsion of abortion bacilli from the uterus via the vagina, as has already been stated, is not of long duration. It requires that the products of all abortions and the by-products of all parturitions and discharges following abortions and parturitions should be treated as dangerous material.

The discharges from the male sexual organs may be dangerous when the bull is permitted to run with the herd, and hence, in the control of bovine infectious abortion, it is desirable that he should have a separate pen, away from the cows, and that he should be permitted to serve cows only on neutral ground, or ground to which cattle do not have access at other times than during that of service. It may also be wise to segregate cows after they have been served by possibly infected bulls until all danger that infected seminal fluid may leak from their vaginas has passed, and to fasten them during such segregation in a way that will prevent them from eating anything that may have become soiled with leakage from their vaginas.

These statements concerning the bull may sound curious to those who continue to hold the once widely entertained hypothesis that bovine infectious abortion is transmitted from cow to cow largely by promiscuously used, unclean bulls. Neither the investigations of the Bureau nor other data on the subject support this hypothesis, which, in fact, has little support other than a general inclination to believe that the channels of infection for microscopic diseases must be the passages through which the attacked portions of the body communicate most easily or directly with its exterior.

It is regrettable that the time is too short to give a detailed account of the work that lies behind the statements this paper

contains. If it could be given it would inspire confidence and show why I am privileged to speak with unfaltering assurance.

Take a problem, for example, like the recurrence of abortion bacilli in the uterus of a cow with an infected udder at each of several successive, apparently normal parturitions. Think of the tests; milk tests, bloods tests, tests of placental material and uterine discharges, tests of calves, etc. Think of the watchfulness to prevent intercurrent infection from becoming a source of error; think of the experiment animals and culture tubes inoculated; think of the subinoculations of animals and culture tubes to validate the use of the results obtained as evidence. And, bear in mind, this work was not done with one or two animals, but with all the accessible cows that could be used as reliable material, until the number was large enough to justify the conclusion that at least half of all cows with infected udders have infected uteruses at the time of calving.

To reveal facts and to secure their recognition and use requires time and work and money; but facts are eternal things and the stock the world has on record is a criterion of its civilization; and probably the conviction that this is true, coupled with a desire to be real agents in the world's progress, has bound many able workers loyally to their poorly remunerated service in research establishments.

CHANNELS OF INFECTION

Microscopic as well as macroscopic parasites have favorite habitats in the bodies of their hosts, and the location of the habitat in most cases has nothing to do with the channels through which the host is invaded. Though this is a matter of common knowledge, many investigators of microparasitic diseases seem to cling to the fallacy that a close relationship exists between the attacked organs and the nearest channels from the exterior of the body through which they may be reached. Hence it is not surprising that it should have been assumed, or that the assumption should have gained wide credence, that the vagina is the common portal of entry for the microparasite of bovine infectious abortion, as the favorite habitat of the parasite is the pregnant uterus, where it attacks primarily neither the parent nor the offispring, but rather the medium through which the two are in communication.

It was early recognized by Bureau investigators that this

assumption lacked proper support, and that, if it were true, the community-owned or association-owned, more or less promiscuously used bull would prove an ideal agent to facilitate the spread of abortion disease among cattle. At the same time it was apparent that the use of a relatively small number of well-bred community or association bulls was vastly more economical than the use to only a fraction of their capacity of a larger number of individually owned scrub bulls. These and other reasons for studying the rôle of the bull in the spread of bovine infectious abortion were unmistakably urgent, and prompted the experimental tests of which the following is a brief outline.

Cows wholly free from abortion infection were given intrauterine injections of pure cultures of abortion bacilli, placental material from cases of abortion, and material obtained from aborted fetuses before they were served by a bull; others were served by bulls which reacted positively to abortion tests; others were served by bulls which had shortly before served cows with infected genital tracts, and others by bulls both naturally and artificially infected which were expelling abortion bacilli with their seminal fluid. Quite a number of cows were used, many of which afterwards were proved to be susceptible to abortion disease; but in all cases the results failed to justify, in the least degree, the assumption that cows are infected with abortion bacilli via their vaginas and uteruses at the time of copulation, or that the bull, through copulation, is an agent in the spread of abortion disease. The cows not only failed to abort, but remained negative to abortion tests. The total number of calves produced was smaller than probably would have been the case if the uteruses of the cows had not been subjected to unnatural treatment and the bulls had not been somewhat deficient in potency because of the diseased condition of their sexual organs; but the cows that conceived passed through their periods of gestation in a normal manner, and the gestations terminated in the normal births of normal calves. In each case after service by infected bulls seminal fluid was collected from the vaginas of the served cows and tested for the presence of abortion bacilli, and the bacilli were repeatedly found in the seminal fluid of one naturally and one artificially infected bull. In each case the placentas and uteruses of the cows were tested after parturition, and no abortion bacilli were found.

Clearly, the uninjured sexual cavities of nonpregnant cows do not serve the abortion bacillus as channels of entry. Whether infection may occur via the vagina after pregnancy has been established has been given little attention by Bureau investigators, mainly because it is not an economically important matter, as such infection could hardly occur elsewhere than in an environment in which the bacilli are very abundant and in which they could easily enter through other channels. Work of other investigators seems to prove that the injection of abortion bacilli into the vaginas and uteruses of pregnant cows leads to abortions.

The community or association bull evidently is harmless so far as infectious abortion is concerned, and he is so without elaborate and troublesome disinfection of his genital organs, provided the precautions already suggested—a bull-pen, service on neutral ground, etc.—are observed.

As the udders of infected cows in many cases harbor abortion bacilli long periods of time, their transferrence from udder to udder during milking seemed reasonably possible. An experiment relative to the matter was made, but the number of animals used was too small and the time they were kept under observation too short to give the negative results obtained full validity, particularly as it was definitely proved that abortion bacilli introduced into the udder, through the teat with a milking tube, soon reach the uterus of a pregnant cow and cause abortion. This is a line of studies that was interrupted by inadequate funds, but the problem with which it dealt is one that is not urgently in need of a solution, because the transferrence of infection from cow to cow through milking would be practically impossible elsewhere than in an environment in which infection through other channels would certainly occur.

The one mode of infection—and I speak in this case of modes that require no artificial practices—that gives positive results is the ingestion of abortion bacilli. When a susceptible, pregnant cow is permitted to ingest abortion bacilli, either pure cultures or material from cases of abortion, she rarely fails to become a victim of the disease. In a large proportion of cases she afterwards aborts and reacts positively to abortion tests, and a large proportion of the cows that do not actually abort after having ingested abortion bacilli show other signs of the

presence of the evil, such as abortion bacilli in the placenta and the uterus at the time of parturition, the production of a weak calf, the occurrence of the bacilli in the udder, etc.

Ingestion, to judge from the investigations of the Bureau and other available data, seems to be the natural mode of entrance for the abortion bacillus into the bodies of its victims, and other conceivable natural modes of entrance, though they may not have been definitely disproved, plainly lack experimental evidence that proves their existence.

Letters are received occasionally from cattle owners describing in detail how the introduction of a new bull into their originally abortion-clean herds was shortly followed by a seriously large number of abortions, with absolutely no discoverable source of infection but the new bull, regarding which it was learned too late that his history could be traced to an abortion-infected herd. In cases like this we may feel confident, if all other sources of infection have been fully excluded—quite a difficult thing, by the way, when we deal with a common, widespread, insidious evil like bovine infectious abortion—that the bull was not only affected with abortion bacillus disease of his reproductive organs, but was also permitted to associate freely with the cows, so that leakage from his penis would lead to the contamination of their food and drink and to their infection through their digestive tracts.

TESTS FOR ABORTION DISEASE

The control measures indicated by the nature of the abortion bacillus, its habitats in the bodies of cattle, the manner and time of its expulsion, and by the channels through which infection occurs, are relatively simple. The real difficulties begin, as naturally would be expected with a disease in which the seemingly healthy carriers of its prime cause are exceptionally numerous, when the distinction between dangerous and safe animals must be made, and this brings us to a consideration of abortion tests.

Among the various tests which have been devised, two, the agglutination and the complement-fixation, alone possess a serviceable degree of efficiency, and the Bureau has found, after having made thousands of comparisons, that on the basis of reliability there is no choice between the two, but that the agglutination test, because of its much greater simplicity, is the one

that should be preferred, and this is a matter on which most investigators are in accord.

These tests have been criticised because they do not show that a cow will abort, and because some cows do not react after they have aborted, and for a number of other reasons; but such criticisms lose most of their weight if we view them with a rational comprehension of what the tests are and of the kind of information they can be expected to give.

To expect that an agglutination or a complement-fixation test for bovine infectious abortion should indicate that a cow will abort would be similar to requiring of the tuberculin test that it should show whether an animal will succumb to tuberculosis within several months; and to expect that every cow that has aborted should react to infectious abortion tests would be like expecting the tuberculin test to show the presence of any disease with necrotic, caseous or calcareous lesions. An abortion is, strictly speaking, the supreme or superlative event in bovine infectious abortion, and not an essential event. We may reasonably say that as all children attacked by diphtheria do not die, so all cows attacked by bovine infectious abortion do not abort; and we may also say that as all diphtheroid lesions are not due to Loeffler's bacillus, all abortions among cows are not due to the Bang bacillus.

The Bang bacillus may enter the body of a cow so shortly before an abortion that a reaction does not occur until some time afterwards, and it is not difficult to believe that in rare instances, owing to recondite or abstruse causes, cows infected with bovine infectious abortion fail to react, just as some tuberculous subjects fail to react to tuberculin. But on the whole, if the agglutination and complement-fixation tests are properly made, they show with an amazing degree of perfection whether an animal is or has been harboring abortion bacilli in its body.

Some of the noteworthy results obtained with the aggutination test by Bureau and other investigators are as follows: If if can be proved that the udder of a cow harbors abortion bacilli, the reaction will be positive in a dilution of 1 to 200 or more; in reactions obtained respectively with milk and blood serum from the same cow, though they may be equal, that of the serum usually is a little stronger; colostrum from infected cows often reacts in enormously high dilutions; the calves of reacting cows

often react, sometimes higher than their dams, but the reactions are passive and do not persist long even when the calves are suckled by cows with infected udders; when two tests are made some time apart, a declining reaction, particularly if it is below 1 to 200, signifies that the animal probably no longer harbors abortion bacilli in its body; bulls which harbor abortion bacilli, in all cases so far tested, react positively, etc.

A reaction in a dilution of 1 to 200, or 1 to 25, or 1 to any other number, as the expression is used in this paper, means that the bacilli in a definitely measured volume of a standard suspension of abortion bacilli are agglutinated by adding to it an amount of serum which is proportioned to the volume of the suspension as the smaller number is proportioned to the larger; thus, a reaction in a dilution of 1 to 200 would mean that the volume of the suspension was 200 times as great as the volume of serum added to it, and, in a reaction of 1 to 25, that the volume of suspension was 25 times as great as that of the serum; consequently, if the volume of the suspension was 1 c.c., that volume of serum in the one case would be 1 divided by 200, or 0.005 c.c., and in the other, 1 divided by 25, or 0.04 c.c.

Reactions vary greatly with material obtained from different cattle that are known to harbor abortion bacilli, and may reach the enormous height, when blood serum is tested, of 1 to 3,200, and when colostrum is tested, of 1 to 25,000. Think a moment of the potency of the specific agglutination agent indicated by these figures. Blood serum and colostrum chemically are complex substances of which, at most, a very small fraction can be supposed to be the agglutination agent; and yet the serum at times agglutinates the bacilli in 3,200 times, and the colostrum in 25,000 times, their own volume of suspension.

What measure of agglutinating power of the blood serum should be regarded as a certainly positive bovine infectious abortion reaction, whether it should be higher than 1 to 50 or as low as 1 to 10, has not been definitely determined and is a subject on which dogmatic statements would be dangerous before all matters relating to the test have been so standardized that a satisfactory comparison can be made between the reactions obtained by different investigators.

The Bureau investigators are strongly inclined to believe, on the one hand, that even a very low agglutinating property of

blood serum for abortion bacilli should be viewed with suspicion, and, on the other, that a declining reaction, particularly if it drops below and remains lower than 1 to 200, indicates that an animal is safe so far as the dissemination of abortion bacilli is concerned.

TREATMENT AND PREVENTION

Treatment of infectious abortion with drugs or chemical agents, either internally or externally, has given little, or no, or only false encouragement. The Bureau's work in this connection, though not abundant, proves—doubtless a matter of common experience—that the more insidious and chronic a disease is, the greater the chances are that those who attempt to treat it may go astray in their valuation of the events that follow treatment, more particularly if the treatment is given under the supervision of a conscientious, capable person who greatly improves the sanitary conditions under which his subjects live, without taking into consideration how much the consequently more hygienic environment may benefit both the affected and the exposed subjects.

Unquestionably it is economical to give proper treatment to cows that have aborted, or that do not clean properly, or that are afflicted with other troubles of the reproductive organs and functions; but such treatment should not include attempts to disinfect the uterine and vaginal cavities by irrigating them with strong germicidal solutions, because such attempts will prove futile and can not be made without serious danger of doing harm. The modern and rational idea of wound treatment should be applied to the treatment of the injured or diseased uterus, and that means the removal of dead and foreign material on which saprophytic and facultative pathogenic microorganisms can feed and multiply, and not the further devitalization of injured and diseased tissues.

Treatment with abortion bacilli, killed and living, alone and in combination with antiserum, has been tried with varying and contradictory results. The Bureau's work on the subject is restricted to the use of killed cultures among pregnant and living cultures among nonpregnant cattle.

In one large herd numbering over 1,000 head of cattle, of which 911 remained under observation one year and 453 a second year, the results from the injection of live organisms before con-

ception were as follows: Treated cattle, first year, 13.12 per cent of abortions; second year, 10.29 per cent. Untreated cattle, first year, 17.7 per cent of abortions; second year, 14.09 per cent. The treated animals in the first year numbered 617 and in the second 311, and the untreated in the first year 294 and in the second 142.

Regarding this herd it should be said that it was located a long distance from Washington, and could not be kept under the close, continuous, personal supervision of those who planned the work, that is desirable in an experimental test, and unfortunately the uninterrupted services of a trained inspector to immediately supervise it failed for reasons over which the Bureau had no control.

The live organism treatment, or attempted immunization, however, in both years, though it was not fully satisfactory, evidently was not attended or followed by ill effects. In both years the proportion of abortions among the treated cattle was a little lower than among the untreated, and the percentages of sterility which developed in the two groups during the time they were under observation were practically alike.

An examination of the available data on the use of living cultures of abortion bacilli to produce immunity shows three things: (1) That very few tests have been made under strict experimental conditions; (2) that the number of abortions among cattle that have received injections some time before conception drops with a noteworthy frequency to approximately 6 per cent, no matter what it may have been before immunization was attempted; and (3) that the per cent of abortions among treated cattle is lower as a rule than among untreated cattle kept under the same conditions.

In connection with this statement it may be interesting to record the observations made in a large, privately owned herd of dairy cattle, which the Bureau includes among its investigational material, and to give a synoptic account of one precisely made experimental test on immunization.

The dairy herd numbers about 200 cattle; it has long been infected with abortion, and the current number of abortions was greatly reduced by raising the heifer calves born in the herd to replace cows as they outlived their usefulness. All the cattle have been repeatedly tested with abortion tests; the proportion

of reacting cows is relatively small, and the reacting and the nonreacting animals are not permitted to come into contact with each other. In this herd about 6 per cent of the cows have aborted during the past year, and the proportion of aborting cows among those that react is about equal to the proportion among those that do not react.

We have here this factor of about 6 per cent which is frequent among abortion-immunized cows. Would it not be pertinent to ask whether it is a figure that approximately indicates the number of abortions among cattle that are due to other causes than the Bang bacillus? We might lightly dismiss this question by saying that we are here face to face with the inefficiency of abortion tests; but let us not be too hasty. It would be surprising if no other causes than the Bang bacillus existed for abortions among cattle, animals superlatively artificial because of the kind of selection that has been practiced in breeding them for human, utilitarian purposes without giving too much thought to what nature intended them to be; and it would likewise be surprising, when we bear in mind how complex the reproductive functions are, if there were no other causes for abortions among cattle than microparasites. Some of the Bureau investigators have determined to devote much time and study to this phase of the abortion question in the future.

And now for the test, which does not include a large number of animals, but was made in harmony with true experimental standards.

Twenty-three cattle, part of a drove of 66, not one of which, according to the tests that could be made, was infected with bovine infectious abortion, were divided into three groups. Eleven received subcutaneous injections of pure living cultures of abortion bacilli about two months before they were served by bulls; 4 received repeated injections of killed cultures of abortion bacilli after they had become pregnant; and 8 were retained untreated, as checks or controls. The 23 cattle were equally and similarly exposed to abortion infection; the exposure was via the digestive tract, or the kind of exposure that would occur in nature, and the material used for the exposure was obtained from actual cases of infectious abortion.

Of the eleven cows treated with live organisms before conception, 10 calved normally in all respects and 1 aborted.

Of the 4 given dead-organism treatment after becoming pregnant, 2 calved normally and 2 aborted.

Of the 8 controls, 7 aborted.

The cattle of the first group, those which received treatment before they were served by a bull, were kept under further observation until they had produced an additional 15 calves. They suffered no breeding troubles, such as retained placentas, sterility, etc.

The number of animals in the second group, only 4, is too small to permit drawing the conclusion that treatment with dead organisms in some measure protects gravid cows; but the difference of 1 abortion among 11 cattle and 1 abortion among 8 can leave little doubt that a serviceable degree of immunity against abortions can be engendered by subcutaneous injections, prior to conception, of living abortion bacilli.

A SEARCH FOR OTHER CAUSES OF ABORTION AMONG CATTLE

A search for other specific causes of abortions among cattle has not been neglected, and Bureau investigators could relate at great length stories similar to those which other investigators have told about microorganisms isolated from the products of abortions and the uteruses of cows that have aborted. Bacilli of various kinds, different types of micrococci, and spirilla or vibrio have been found repeatedly; but when their pathogenicity has been tested in accordance with widely recognized and accepted and required bacteriological standards, not one shred of evidence has been obtained to prove them true etiological factors of bovine abortions. What rôle such microorganisms may have as causes of the sequelæ of infectious abortions, and of other, possibly independent, abnormal processes in the reproductive organs, is far from clear and merits careful study.

BOVINE INFECTIOUS ABORTION AMONG SWINE

At times the Bang bacillus attacks sows and causes abortions among them. Attention has been given to this matter, but as yet little progress has been made. The Bureau's work indicates that swine are strongly resistant against ordinary strains of the abortion bacillus, but is not conclusive on the subject. So far we have been able to procure only two strains of the bacillus isolated from outbreaks of abortion among swine, and these strains, though in other respects like those obtained from cattle, are not wholly like them in the lesions they cause in guinea-

pigs. One of the strains causes lesions much grosser in character, and the other has the peculiarity of causing orbital tumors in a large proportion of guinea-pigs injected with it, which lead to a crowding forward and an extreme protrusion and the gradual destruction of the eye. While it is remarkable that both strains of the bacillus derived from swine should vary more from the general type obtained from cattle than strains from cattle vary from one another, we must remember that it is only two strains we have studied. One of the strains caused abortions in both a sow and a cow, and in this case the sow was exposed through ingestion, and the organism was afterwards recovered from her uterus and the aborted fetuses. With serological tests both strains act precisely like ordinary abortion bacilli.

It will be apparent from what I have said that much work on infectious abortion has been done and that valuable results have been obtained, and it will also be apparent that much remains to be done. The work is peculiarly of a kind that requires time, diligent application, long-sustained interest and considerable expenditures of money. I hope that the outline presented will convince you that what has been accomplished justifies that the work should be continued and liberally financed.

BUSINESS TAKES GOVERNMENT PERSONNEL

An editorial in the Washington *Post*, based upon the Civil Service report, says: "Business has a keen scent, and it tracks down its man and lures him to its own service just at the time when the display of his abilities has shown that he is about to become of greatest value to the Government. The drift of personnel from an official to a business career is at some periods stronger and more noticeable than at others, but the outlet is generally wide open and is never closed up. It is unnecessary to point out how undesirable, from a public point of view, such a leakage is. If the Government were a wise and farseeing employer, it would hold out such inducements to those who enter its service that the tendency to slip away from it would be scarcely, if at all, existent and the exodus of its best and brainiest officers would be stopped or greatly checked. The annual report of the Civil Service Commission, just published, emphasizes the danger which threatens the public service because of this continuous drain on its human resources."

INVESTIGATIONS ON THE USE OF VACCINES MADE FROM BACILLUS OVISEPTICUS [1]

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THE SKEPTICISM regarding the value of commercially prepared vaccines against hemorrhagic septicemia, which has been aroused by the publication of Nebraska Research Bulletins Nos. 17 and 18 (1), has led practitioners and investigators to the point of inquiring, not only whether there is value in commercially prepared vaccines for these diseases, but whether the whole practice of immunization against them is on a secure basis. Judging from the comments which have appeared in recent publications, there are those who are not only doubtful of the value of commercially prepared vaccines, but are even questioning the posssibility of producing an efficient vaccine by present methods. It seemed to us at this time that any addition to our knowledge which is based upon controlled experiments might be received with interest even if of no permanent value. Therefore we have collected some experiments done by us during the past four years and merely present them for your consideration, realizing that they are somewhat incomplete and are too few for final conclusions.

Ever since the classical work of Pasteur (2), in which he seemed to show that an efficient vaccine might be produced against chicken cholera by allowing the cultures to become avirulent and then using them alive, much interest has been exhibited in an attempt to produce immunizing agents against all of the hemorrhagic septicemias.

Kitt (3), following Pasteur, came to the conclusion that the Pasteur method was not only inefficient but dangerous, as there was always a possibility of transmitting the disease.

In this country possibly the most painstaking work has been done by Hadley (4), who found that strains of chicken cholera organisms failed in their capacity to stimulate the production of immunizing substances in rabbits and fowls. His earlier

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[1] Presented at the fifty-eighth annual meeting of the American Veterinary Medical Association, Denver, Colo., September 5-9, 1921.

work seemed to indicate that no value might be expected from the use of an organism killed by heating at 63° C. for 20 minutes, but that one of his strains, which was avirulent, could be used alive on rabbits, and did give a considerable degree of protection. In a later bulletin he made the discovery that a considerable immunizing value could be had even by using dead organisms.

Since our work has dealt entirely with *Bacillus ovisepticus*, we prefer to discuss the work done by other investigators with this organism, although the literature in the whole field of hemorrhagic septicemia immunization is very inviting.

In 1898 Lignieres (5), after having investigated the disease known in Argentina as lombriz, developed a polyvalent vaccine made by growing the organisms at higher temperatures than normal, thereby reducing their virulence. With this he claimed considerable success.

Later, in 1910, Miessner and Schern (6), working in Germany, tried the method of Lignieres, but with rather unsatisfactory results. They then produced a bacterial extract by grinding the organisms and claimed from this procedure a considerable success. They were also able to obtain some protection by the use of an antiserum.

A survey of the literature does not show that any one of these procedures came into common use in the countries mentioned. Since the use of a killed organism had become common in this country for protection against hemorrhagic septicemia in cattle and swine, it was only to be expected that the same type of immunizing substance should be tried on sheep. Our work, therefore, has dealt with the value of the killed organism first, and finally of a live culture.

EXPERIMENTS ON RABBITS

Experiment No. 1

Our first experiment was conducted with rabbits. The culture used in this experiment was our No. 23. The vaccine was produced by growing the organisms in bouillon for 48 hours, then heating in a water bath at 60° C. for 30 minutes, after which ½ of 1 per cent of phenol was added. Vaccines grown in this way usually contained between 7 and 10 billion organisms per cubic centimeter. The determination of the minimum lethal dose was made according to Table 1.

TABLE 1.—TO DETERMINE THE MINIMUM LETHAL DOSE FOR RABBITS.

Date	Number	Weight (Grams)	Amount (C. C.)	Result
May 2, 1918	1	550	0.25	Death
do.	2	550	.1	do.
do.	3	550	.02	do.
do.	4	550	.01	do.
May 3, 1918	5	825	.01	do.
do.	6	716	.002	do.
do.	7	685	.001	do.
do.	8	590	.0001	do.
May 7, 1918	9	570	.0001	do.
do.	10	830	.00001	do.
do.	11	685	.000001	do.
do.	12	885	.0000001	Lived

Five rabbits were then taken and each given 0.5 c.c. of the vaccine. Eleven days later these rabbits were given amounts varying from one thousandth to one ten millionth of the culture. Five rabbits were given the same amounts of the culture and were used as controls. All rabbits died. At a slightly later time five rabbits were again given 0.5 c.c. of the vaccine and 17 days later all were given one millionth of 1 c.c. of the culture. Only one control was used, which was given the same amount as the others. The result was that all of the vaccinated rabbits died and the control lived. This experiment indicated that the vaccine produced by us had no immunizing value in rabbits against strain No. 23.

TABLE 2.—TO DETERMINE THE VALUE OF VACCINE FOR RABBITS

No.	Weight (Grams)	Vaccine		Culture		Result
		Date	Amount (C. C.)	Date	Amount (C. C.)	
1	710	May 2, 1918	0.5	May 13, 1918	0.001	Died
2	555	do.	.5	do.	.0001	do.
3	540	do.	.5	do.	.00001	do.
4	885	do.	.5	do.	.000001	do.
5	545	do.	.5	do.	.0000001	do.
6	.....	Control	.....	do.	.001	do.
7	.....	do.	.....	do.	.0001	do.
8	.....	do.	.....	do.	.00001	do.
9	.....	do.	.....	do.	.000001	do.
10	.....	do.	.....	do.	.0000001	do.
11	410	May 26, 1918	.5	June 12, 1918	.000001	do.
12	410	do.	.5	do.	.000001	do.
13	410	do.	.5	do.	.000001	do.
14	410	do.	.5	do.	.000001	do.
15	410	do.	.5	do.	.000001	do.
16	410	Control	.....	do.	.000001	Lived

EXPERIMENTS ON SHEEP

Experiment No. 1

Our preliminary experiments having shown that not much was to be expected from rabbit inoculations, we were curious to know if any immunizing value might be had in sheep. We, there-

fore, selected 5 lambs weighing about 50 pounds each, and gave each of them 2 c.c. of a vaccine made as previously described. Eleven days later 3 of the vaccinated lambs were given intravenously 5 c.c. of a 48-hour bouillon culture of strain No. 23; one was given 10 c.c. and one 1 c.c. A control was given 5 c.c. The vaccinated sheep receiving 10 c.c. of the culture and one of those receiving 5 c.c. was found dead on the morning following the injection. The one receiving 1 c.c. died eleven days later, and another receiving 5 c.c. died on the 12th day. The control having received 5 c.c. died on the sixth day. One of the vaccinated sheep survived.

TABLE 3.—TO DETERMINE VALUE OF VACCINE FOR SHEEP. (EXPERIMENT NO. 1).

No.	Vaccine		Culture		Result
	Date	Amount (C. C.)	Date	Amount (C. C.)	
1	June 1, 1918	2	June 12, 1918	5	Death, 1 day.
2	do.	2	do.	5	Death, 12 days.
3	do.	2	do.	5	Very sick for 2 weeks; recovered.
4	do.	2	do.	10	Death, 1 day.
5	do.	2	do.	1	Death, 11 days.
6	Control	.....	do.	5	Death, 6 days.
7	do.	.....	.....	0	Lived.

Experiment No. 2

Having shown that a vaccine made by us was of little value, we set up this experiment in which we used two well-known commercially prepared vaccines. Three lots consisting of 3 sheep each were selected. Lot No. 1, consisting of 3 animals, was given 2 c.c. of a commercially prepared vaccine. Lot No. 2 was treated in the same manner with a commercially prepared vaccine from another source. Lot No. 3, consisting of 3 animals, was used as a control. Twelve days after vaccination one animal in each lot was given 10 c.c. of a 48-hour bouillon culture of our strain No. 23, one was given 5 c.c. and one 1 c.c., all intravenously. All three of the animals receiving 10 c.c. were found dead the following day. Of the lambs receiving 5 c.c., the one in lot No. 1 died three days after the injection; the one in Lot No. 2 sickened for one week but recovered; the one in Lot No. 3, being the control, died on the sixteenth day. Of the ones receiving 1 c.c., one in Lot No. 1 sickened and always remained lame in the left hind leg; one in Lot No. 2 sickened and remained lame in the right hind leg for several weeks; the control sickened and remained lame in the left hind leg for two weeks.

TABLE 4.—TO DETERMINE THE VALUE OF VACCINE FOR SHEEP. (EXPERIMENT NO. 2.)

No.	Vaccine		Culture		Result
	Date	Amount (C. C.)	Date	Amount (C. C.)	
PEN NO. 1, COMMERCIAL VACCINE NO. 1.					
1	July 26, 1918	2	August 7, 1918	10	Death, 1 day.
2	do.	2	do.	5	Death, 13 days.
3	do.	.....	do.	1	Sickened and always remained lame in left hind leg.
PEN NO. 2, COMMERCIAL VACCINE NO. 2.					
1	July 26, 1918	2	August 7, 1918	10	Death, 1 day.
2	do.	2	do.	5	Sickened for a week but recovered.
3	do.	2	do.	1	Sickened and lame in right hind leg for several weeks.
PEN NO. 3, CONTROL, NO VACCINE.					
1	.....	.....	August 7, 1918	10	Death, 1 day.
2	.....	.....	do.	5	Death, 16 days.
3	.....	.....	do.	1	Sickened; remained lame in left hind leg for 2 weeks.

Although it would be presumptuous to conclude on such a small number of animals, the appearance here purely on the face of the results is that some slight protection was given by commercially prepared vaccine used in Lot No. 2.

Experiment No. 3

It having seemed up to this time that little value might be expected from an organism killed by heat, in the preparation of the vaccine for this experiment, we omitted the heating and added phenol to ½ of 1 per cent. Four lambs were then vaccinated as follows: No. 1 was given 10 c.c. of this vaccine, No. 2, 5 c.c., No. 3, 2 c.c. and No. 4, 2 c.c. at each of two injections, 12 days apart. Fourteen days after vaccination, each of the vacci-

TABLE 5.—TO DETERMINE THE VALUE OF VACCINE FOR SHEEP. (EXPERIMENT NO. 3.)

No.	Vaccine		Culture		Result
	Date	Amount (C. C.)	Date	Amount (C. C.)	
1	Dec. 28, 1918	10	Jan. 11, 1919	10	Lived.
2	Dec. 30, 1918	5	do.	10	Lived.
3	Dec. 30, 1918	2	do.	10	Death, 1 day.
4	Dec. 30, 1918 Jan. 11, 1919	2	Feb. 13, 1919	10	Lived.
5	Control	.....	do.	10	Death, 1 day.
6	do.	.....	do.	5	Lived.
7	do.	.....	do.	1	Lived.

nated animals was given 10 c.c. of our culture No. 23 intravenously. Three controls were selected, one given 10 c.c., one 5 c.c. and one 1 c.c. Of the vaccinated animals only No. 3, the one which had received 2 c.c. in a single dose, died. Of the controls, the one receiving 10 c.c. died, the other two survived.

On the face of these results it would seem that some immunizing value was had by the use of phenolized cultures when given in greater dosage than 2 c.c.

Experiment No. 4

In this experiment it had been decided to give the injection of the virulent culture subcutaneously, since all previous work had been done intravenously. Five lambs were vaccinated with a phenolized culture as follows: No. 1 was given 2 c.c.; No. 2, 5c.c.; No. 3, 10 c.c.; No. 4, 2 c.c. at each of two injections, and No. 5, 2 c.c. at each of three injections. Twenty-eight days after the first injection was administered all were given 20 c.c. subcutaneously. Of two controls which had been selected, three days previous to these injections, the one receiving 20 c.c. of the virulent culture died in one day and the one receiving 10 c.c. sickened but recovered. All of the vaccinated animals having survived the 20 c.c. of the culture, another control was given 20 c.c. on the following day, which animal sickened but survived. Unfortunately this circumstance seems to invalidate any conclusion that might be drawn from this experiment.

TABLE 6.—EXPERIMENT NO. 4, SUBCUTANEOUS INOCULATION.

No.	Vaccine		Culture		Result
	Date	Amount (C. C.)	Date	Amount (C. C.)	
1	Jan. 18, 1919	2	Feb. 15, 1919	20	Lived.
2	do.	5	do.	20	do.
3	do.	10	do.	20	do.
4	Jan. 18, 1919 Jan. 25, 1919	2	do.	20	do.
5	Jan. 18, 1919 Jan. 25, 1919 Feb. 1, 1919	2	do.	20	do.
6	Control	.....	Feb. 12, 1919	20	Death, 1 day.
7	do.	.....	do.	10	Sickened, but recovered.
8	do.	.....	Feb. 16, 1919	20	do.

Experiment No. 5

In this experiment the vaccine was a phenolized culture as formerly, the strain used being our No. 33. This experiment is presented more especially to show what happens when the minimum lethal doses are not determined, although it may be

added that the probability is that the lethal dose of this culture was not greatly below 10 c.c., which would indicate that no considerable degree of immunity had been obtained.

TABLE 7.—EXPERIMENT NO. 5.

No.	Vaccine		Culture		Result
	Date	Amount (C. C.)	Date	Amount (C. C.)	
1	Jan. 17, 1920	10	Jan. 30, 1920	10	Death, 1 day.
2	do.	5	do.	10	do.
3	do.	2	do.	10	do.
4	Jan. 17, 1920 Jan. 27, 1920	2	Feb. 2, 1920	10	do.
5	.....	.....	Jan. 30, 1920	10	do.

Experiment No. 6

The work up to this time had been so conflicting that we determined to find out whether vaccine had any protective value, not only as determined by injection of a lethal dose of culture, but also as measured by agglutination. The culture used was our strain No. 33.

TABLE 8.—EXPERIMENT NO. 6.

No.	Date	Vaccine, subcutaneous	Culture, intravenous	Agglutination							Remarks
				1:10	1:25	1:50	1:100	1:250	1:500	1:1000	
		(c. c.)	(c. c.)								
1	Feb. 2, 1920	2	.....	−	−	−	−	.....	.....	.....	
2	do.	2	.....	+	+	+	+	.....	.....	.....	
1	Feb. 9, 1920	5	.....	+	+	+	+	−	−	−	
2	do	5	.....	+	+	+	−	−	−	−	
1	Feb. 16, 1920	10	.....	....	....	....	+	−	−	−	
2	do.	10	.....	....	....	....	+	−	−	−	
1	Feb. 24, 1920	20	.....	....	....	....	+	−	−	−	
2	do.	20	.....	....	....	....	+	−	−	−	
1	March 3, 1920	.....	2	....	....	....	+	−	−	−	
2	do.	.....	2	....	....	....	+	−	−	−	
1	March 12, 1920	.....	5	....	....	....	+	−	−	−	
2	do.	.....	5	....	....	....	+	−	−	−	
1	March 19, 1920	.....	10	....	....	....	+	−	−	−	Sick on day following; temperature 106.8.
2	do.	.....	10	....	....	....	+	−	−	−	Sick on day following; temperature 105.8.
1	April 2, 1920	.....	15	....	....	....	+	−	−	−	Apparently normal; temperature 105.4.
2	April 3, 1920	.....	15	....	....	....	+	−	−	−	Depressed, dull; temperature 106.4.
1	April 15, 1920	.....	.....	....	....	....	+	+	−	−	
2	do.	.....	.....	....	....	....	+	+	−	−	
1	May 4, 1920	.....	.....	....	....	....	+	+	−	−	
2	do.	.....	.....	....	....	....	+	+	−	−	
1	June 16, 1920	.....	.....	....	....	....	+	+	−	−	
2	do.	.....	.....	....	....	....	+	+	−	−	
1	July 1, 1920	.....	.....	....	....	....	+	+	−	−	
2	do.	.....	.....	....	....	....	+	+	−	−	

It will be seen from Table 8 that two lambs were selected and given increasing doses of a phenolized culture of *Bacillus ovi-*

septicus subcutaneously until 20 c.c. had been administered in this way. This procedure brought up the agglutinin content of No. 1 from 0 to 100. The agglutinin content of No. 2 stood at 1-100 on first test and was not increased. Intravenous inoculations of bouillon cultures were then started, and this was continued until 15 c.c. were given. The lethal dose of this culture was something less than 10 c.c., and while the animals withstood this dose, and the 15 c.c. dose also, yet they were made ill by both inoculations. Following the 15 c.c. dose, the agglutinin content increased from 1 to 250, but never increased beyond this. It appeared from this experiment that it was possible to immunize sheep against lethal doses of *Bacillus ovisepticus*.

Experiment No. 7

This experiment was arranged to determine whether vaccination with the live organism was better than by the use of a phenolized culture. The whole experiment was checked by means of the agglutination test. Three animals were given 2, 5 and 10 c.c. of a phenolized culture subcutaneously. Three others were given the same amount of a 48-hour bouillon culture subcutaneously. Three were used as controls and remained unvaccinated. Twenty-three days after the administration of the phenolized organism, and 21 days after the administration of the live culture, the vaccinated animals and one control were given 10 c.c. of a virulent organism intravenously. Two of the controls had previously been given 7 c.c. of the same kind of culture. The 10 c.c. and one of the 7 c.c. controls died; the other survived. Of those vaccinated with the phenolized organism, the one receiving 2 c.c. became ill but survived, the other two died. Of those receiving the live organism as vaccine, all survived without showing any signs of illness.

The aggultination test did not reveal the presence of any antibodies in the blood of any of the animals at the beginning of the experiment. Two days after the introduction of 10 c.c. of the phenolized culture, agglutination was positive in 1 to 10. This agglutinating ability was quite transient, as it did not appear again until 14 days after the vaccine had been administered. As measured by the agglutination test, the other two of this group showed no protection, although it will be remembered that No. 1, the one receiving the least amount of vaccine, survived the virulent culture.

On the day following the introduction of the bouillon culture used as vaccine, all three animals showed the presence of agglutinins in the blood. This gradually increased in intensity until the time of the injection of the virulent culture, when the one receiving 2 c.c. showed agglutination at 1 to 25, 5 c.c. showed 1 to 50, and 10 c.c. showed 1 to 100.

It would appear from this experiment that the live organism gives greater immunity as vaccine than does that to which phenol has been added.

TABLE 9.—EXPERIMENT NO. 7.

No.	Date	Agglutination				Remarks
		1:10	1:25	1:50	1:100	
1	July 2, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
4	do.	−	−	−	−	
5	do.	−	−	−	−	
6	do.	−	−	−	−	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	July 8, 1920	−	−	−	−	2 c. c. vaccine subcutaneously.
2	do.	−	−	−	−	5 c. c. vaccine subcutaneously.
3	do.	−	−	−	−	10 c. c. vaccine subcutaneously.
4	do.	−	−	−	−	
5	do.	−	−	−	−	
6	do.	−	−	−	−	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	July 9, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
1	July 10, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	+	−	−	−	
4	do.	−	−	−	−	2 c. c. 48-hour bouillon culture subcutaneously.
5	do.	−	−	−	−	5 c. c. 48-hour bouillon culture subcutaneously.
6	do.	−	−	−	−	10 c. c. 48-hour bouillon culture subcutaneously.
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	July 11, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	±	−	−	−	
4	do.	+	−	−	−	Temperature 105.8
5	do.	+	+	−	−	Temperature 106
6	do.	+	+	−	−	Temperature 105.2
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	Temperature 105
1	July 12, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
4	do.	+	−	−	−	
5	do.	+	±	−	−	
6	do.	+	+	−	−	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	

TABLE 9.—EXPERIMENT NO. 7—CONTINUED.

No.	Date	Agglutination				Remarks
		1:10	1:25	1:50	1:100	
1	July 13, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
4	do.	+	−	−	−	
5	do.	+	−	−	−	
6	do.	+	±	−	−	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	July 14, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
4	do.	+	−	−	−	
5	do.	+	−	−	−	
6	do.	+	±	−	−	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	July 15, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
4	do.	+	−	−	−	
5	do.	+	±	−	−	
6	do.	+	+	−	−	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	July 16, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
4	do.	±	−	−	−	
5	do.	+	±	−	−	
6	do.	+	+	−	−	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	July 17, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
4	do.	±	−	−	−	
5	do.	+	+	−	−	
6	do.	+	+	±	−	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	July 18, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
4	do.	−	−	−	−	
5	do.	+	−	−	−	
6	do.	+	+	±	−	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	July 19, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
4	do.	+	−	−	−	
5	do.	+	±	−	−	
6	do.	+	+	+	−	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	

TABLE 9.—EXPERIMENT NO. 7—CONTINUED.

No.	Date	Agglutination				Remarks
		1:10	1:25	1:50	1:100	
1	July 20, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
4	do.	+	−	−	−	
5	do.	+	−	−	−	
6	do.	+	+	±	−	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	July 21, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
4	do.	+	+	−	−	
5	do.	+	+	−	−	
6	do.	+	+	+	+	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	July 22, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	+	−	−	−	
4	do.	+	+	−	−	
5	do.	+	+	+	−	
6	do.	+	+	+	+	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	July 23, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	+	−	−	−	
4	do.	+	+	−	−	
5	do.	+	+	±	−	
6	do.	+	+	+	+	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	July 31, 1920	.....	.....	.....	.....	10 c. c. 48-hour bouillon culture intravenously 10 a. m.
2	do.	.....	.....	.....	.....	do.; 2.45 p. m., very ill.
3	do.	.....	.....	.....	.....	do.; 2.45 p. m., dead.
4	do.	.....	.....	.....	.....	10 c. c. 48-hour bouillon culture intravenously 10 a. m.
5	do.	.....	.....	.....	.....	do.
6	do.	.....	.....	.....	.....	do.
7	do.	.....	.....	.....	.....	do.
8	July 26, 1920	.....	.....	.....	.....	7 c. c. 48-hour bouillon culture intravenously 10 a. m.
9	do.	.....	.....	.....	.....	do.
1	August 1, 1920	.....	.....	.....	.....	Very ill; temperature 106.2.
2	do.	.....	.....	.....	.....	9 a. m., dead.
4	do.	.....	.....	.....	.....	Normal; eating; temperature 104.6.
5	do.	.....	.....	.....	.....	Normal; eating; temperature 104.8.
6	do.	.....	.....	.....	.....	Normal; eating; temperature 105.
7	do.	.....	.....	.....	.....	Very ill; unable to stand; temperature 106.
8	July 27, 1920	.....	.....	.....	.....	Normal; eating; temperature 104.6.
9	do.	.....	.....	.....	.....	Very ill; not eating; temperature 106.2.
1	August 2, 1920	.....	.....	.....	.....	Looks better; eating; temperature 105.
4	do.	.....	.....	.....	.....	Normal; temperature 104.8.
5	do.	.....	.....	.....	.....	Normal; temperature 104.8
6	do.	.....	.....	.....	.....	Normal; temperature 104.6.
7	do.	.....	.....	.....	.....	8 a. m., dead.
8	July 28, 1920	.....	.....	.....	.....	Normal; temperature 104.8.
9	do.	.....	.....	.....	.....	Down; unable to rise.

TABLE 9.—EXPERIMENT NO. 7—CONTINUED.

No.	Date	Agglutination				Remarks
		1:10	1:25	1:50	1:100	
1	August 3, 1920	.....	.....	.....	.....	Normal.
4	do.	.....	.....	.....	.....	do.
5	do.	.....	.....	.....	.....	do.
6	do.	.....	.....	.....	.....	do.
8	July 29, 1920	.....	.....	.....	.....	do.
9	do.	.....	.....	.....	.....	Dead.
1	Sep. 14, 1920	−	−	−	−	
4	do.	+	+	+	+	
5	do.	+	±	−	−	
6	do.	+	+	+	+	
8	do.	−	−	−	−	

Experiment No. 8

This experiment is practically a duplication of No. 7, with a view to determining whether the live organism is of greater value as a vaccine than the dead.

TABLE 10.—EXPERIMENT NO. 8.

No.	Date	Agglutination				Remarks
		1:10	1:25	1:50	1:100	
1	Jan. 31, 1920	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
4	do.	−	−	−	−	
5	do.	−	−	−	−	
6	do.	−	−	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	±	−	−	−	
1	Feb. 7, 1921	−	−	−	−	
2	do.	−	−	−	−	
3	do.	−	−	−	−	
4	do.	−	−	−	−	
5	do.	−	−	−	−	
6	do.	−	−	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	Feb. 14, 1921	.....	.....	.....	.....	2 c. c 48-hour bouillon culture subcutaneously.
2	do.	.....	.....	.....	.....	5 c. c. 48-hour bouillon culture subcutaneously.
3	do.	.....	.....	.....	.....	10 c. c. 48-hour bouillon culture subcutaneously.
4	Feb. 15, 1921	.....	.....	.....	.....	2 c. c. vaccine subcutaneously.
5	do.	.....	.....	.....	.....	5 c. c. vaccine subcutaneously.
6	do.	.....	.....	.....	.....	10 c. c. vaccine subcutaneously.
1	Feb. 16, 1921	+	−	−	−	
2	do.	+	−	−	−	
3	do.	+	−	−	−	
4	do.	−	−	−	−	
5	do.	+	−	−	−	
6	do.	−	−	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	

TABLE 10.—EXPERIMENT NO. 8—CONTINUED.

No.	Date	Agglutination				Remarks
		1:10	1:25	1:50	1:100	
1	Feb. 17, 1921	−	−	−	−	
2	do.	+	−	−	−	
3	do.	+	−	−	−	
4	do.	−	−	−	−	
5	do.	+	−	−	−	
6	do.	−	−	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	Feb. 18, 1921	−	−	−	−	
2	do.	+	−	−	−	
3	do.	+	−	−	−	
4	do.	−	−	−	−	
5	do.	+	−	−	−	
6	do.	−	−	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	Feb. 19, 1921	−	−	−	−	
2	do.	+	−	−	−	
3	do.	+	−	−	−	
4	do.	−	−	−	−	
5	do.	+	−	−	−	
6	do.	−	−	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	Feb. 21, 1921	−	−	−	−	
2	do.	+	−	−	−	
3	do.	+	−	−	−	
4	do.	−	−	−	−	
5	do.	+	−	−	−	
6	do.	−	−	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	Feb. 22, 1921	±	−	−	−	
2	do.	+	+	−	−	
3	do.	+	−	−	−	
4	do.	−	−	−	−	
5	do.	+	−	−	−	
6	do.	−	−	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	Feb. 23, 1921	−	−	−	−	
2	do.	+	−	−	−	
3	do.	+	−	−	−	
4	do.	−	−	−	−	
5	do.	+	−	−	−	
6	do.	−	−	−	−	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	Feb. 24, 1921	±	−	−	−	
2	do.	+	+	−	−	
3	do.	+	−	−	−	
4	do.	+	−	−	−	
5	do.	+	−	−	−	
6	do.	+	−	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	

TABLE 10.—EXPERIMENT NO. 8—CONTINUED.

No.	Date	Agglutination				Remarks
		1:10	1:25	1:50	1:100	
1	Feb. 25, 1921	±	−	−	−	
2	do.	+	−	−	−	
3	do.	+	−	−	−	
4	do.	−	−	−	−	
5	do.	+	−	−	−	
6	do.	−	−	−	−	
7	do.	−	−	−	−	
8	do.	−	−	−	−	
9	do.	−	−	−	−	
1	Feb. 26, 1921	−	−	−	−	
2	do.	+	−	−	−	
3	do.	+	−	−	−	
4	do.	+	−	−	−	
5	do.	+	−	−	−	
6	do.	+	−	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	Feb. 28, 1921	−	−	−	−	
2	do.	+	+	−	−	
3	do.	+	−	−	−	
4	do.	+	−	−	−	
5	do.	+	−	−	−	
6	do.	+	−	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	March 1, 1921	−	−	−	−	
2	do.	+	+	−	−	
3	do.	+	−	−	−	
4	do.	+	−	−	−	
5	do.	+	−	−	−	
6	do.	−	−	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	March 2, 1921	+	−	−	−	
2	do.	+	+	+	−	
3	do.	+	+	−	−	
4	do.	+	−	−	−	
5	do.	+	−	−	−	
6	do.	+	−	−	−	
7	do.	+	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	March 3, 1921	+	±	−	−	
2	do.	+	+	±	−	
3	do.	+	+	+	−	
4	do.	+	−	−	−	
5	do.	+	+	−	−	
6	do.	+	+	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	March 4, 1921	+	+	−	−	
2	do.	+	+	+	+	
3	do.	+	+	+	−	
4	do.	+	−	−	−	
5	do.	+	+	−	−	
6	do.	+	+	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	

TABLE 10.—EXPERIMENT NO. 8—CONTINUED.

No.	Date	Agglutination				Remarks
		1:10	1:25	1:50	1:100	
1	March 5, 1921	+	+	−	−	
2	do.	+	+	+	+	
3	do.	+	+	+	−	
4	do.	+	−	−	−	
5	do.	+	+	−	−	
6	do.	+	+	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	March 7, 1921	+	+	−	−	
2	do.	+	+	+	+	
3	do.	+	+	+	±	
4	do.	+	−	−	−	
5	do.	+	+	−	−	
6	do.	+	+	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	March 8, 1921	+	+	−	−	
2	do.	+	+	+	+	
3	do.	+	+	+	±	
4	do.	+	−	−	−	
5	do.	+	+	−	−	
6	do.	+	+	−	−	
7	do.	−	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	March 9, 1921	+	+	−	−	
2	do.	+	+	+	+	
3	do.	+	+	+	−	
4	do.	+	−	−	−	
5	do.	+	+	−	−	
6	do.	+	+	±	−	
7	do.	+	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	March 10, 1921	+	+	−	−	
2	do.	+	+	+	+	
3	do.	+	+	+	−	
4	do.	+	−	−	−	
5	do.	+	+	−	−	
6	do.	+	+	+	−	
7	do.	+	−	−	−	
8	do.	+	−	−	−	
9	do.	−	−	−	−	
1	March 16, 1921	.....	.....	.....	.....	2.40 p.m., 20 c.c. 48-hour bouillon culture intravenously.
2	do.	.....	.....	.....	.....	do.
3	do.	.....	.....	.....	.....	do.
4	do.	.....	.....	.....	.....	do.
5	do.	.....	.....	.....	.....	do.
6	do.	.....	.....	.....	.....	do.
7	do.	.....	.....	.....	.....	2.40 p. m., 10 c. c. 48-hour bouillon culture intravenously.
8	do.	.....	.....	.....	.....	2.40 p. m., 15 c. c. 48-hour bouillon culture intravenously.
9	do.	.....	.....	.....	.....	2.40 p. m., 20 c. c. 48-hour bouillon culture intravenously

TABLE 10.—EXPERIMENT NO. 8—CONTINUED.

No.	Date	Agglutination				Remarks
		1:10	1:25	1:50	1:100	
1	March 17, 1921	.....	.....	.....	.....	8.15 a. m., eating a little.
2	do.	.....	.....	.....	.....	Dull, respiration rapid.
3	do.	.....	.....	.....	.....	Dull, lame in hind leg.
4	do.	.....	.....	.....	.....	Dead.
5	do.	.....	.....	.....	.....	Eating a little; temperature 105.
6	do.	.....	.....	.....	.....	Eating a little; temperature 104.2.
7	do.	.....	.....	.....	.....	Dead.
8	do.	.....	.....	.....	.....	Respiration rapid; not eating; temperature 105.2.
9	do.	.....	.....	.....	.....	Down, comatose, labored respiration; temperature 105.2.
1	March 18, 1921	.....	.....	.....	.....	9.00 a. m., stiff, quite lame in front; eating some; lies most of time.
2	do.	.....	.....	.....	.....	Eating little; stiff, but seems to feel well.
3	do.	.....	.....	.....	.....	Very stiff; discharge from nose; lies most of time.
5	do.	.....	.....	.....	.....	Very lame in front; rises with difficulty. Epistaxis.
6	do.	.....	.....	.....	.....	Eating; looks well.
8	do.	.....	.....	.....	.....	Not eating; head down; moves with difficulty.
1	March 19, 1921	.....	.....	.....	.....	Very dull; down; can not rise.
2	do.	.....	.....	.....	.....	Eating; feels well.
3	do.	.....	.....	.....	.....	Eating a little; feels better.
5	do.	.....	.....	.....	.....	Down; unable to rise; not eating.
6	do.	.....	.....	.....	.....	Feeling well.
8	do.	.....	.....	.....	.....	Down; rises with difficulty; not eating.
1	.....	.....	.....	.....	.....	Gradually got worse and died April 5, 1921.
2	.....	.....	.....	.....	.....	Continued normal.
3	.....	.....	.....	.....	.....	Gradually improved and became normal about April 8, 1921.
5	.....	.....	.....	.....	.....	Gradually grew worse and died May 9, 1921.
6	.....	.....	.....	.....	.....	Continued normal.
8	.....	.....	.....	.....	.....	Remained down for a month, but finally recovered, although one knee remained swollen.

It was found necessary to use a larger dose of the virulent culture than in the previous experiment; consequently 20 c.c. was established. The three controls were given 10, 15 and 20 c.c. respectively. Of these, the one receiving 10 and 20 died, the one receiving 15 became very ill and remained down for over a month. He finally survived, however, although one knee remained swollen for a considerable period of time.

Of those receiving the phenolized culture, the 2 c.c. animal died on the day after injection; the 5 c.c. animal sickened and died some six weeks after the inoculation; the 10 c.c. remained healthy.

Of those receiving the live organism as vaccine, the one receiving 2 c.c sickened and died some three weeks later, the one receiving 5 c.c. continued normal, and the one receiving 10 c.c. sickened but recovered after being ill for about three weeks.

On the day following the administration of the culture as vaccine all three of the animals showed agglutination at 1:10. The one that received 2 c.c. then showed no agglutination for four days, when after several doubtful reactions it became positive in 1:10 and finally in 1:25, where it remained until the injection of the lethal dose. The one receiving 5 c.c. stood at 1:10 for several days, then at 1:25 for the first time on the seventh day, at 1:50 on the fifteenth day, 1:100 on the seventeenth day, where it remained until injected. The one receiving 10 c.c. showed at 1:10 on the next day, 1:25 on the fifteenth day, and 1:50 on the seventeenth day, where it remained except for a couple of doubtful reactions until the injection. It is interesting that the animal receiving 5 c.c. in this series showed the highest agglutination and the least disturbance when injected.

In the series receiving the phenolized culture the one getting 2 c.c. showed agglutination constantly at 1:10, after the eleventh day, but never increased beyond this. The 5 c.c. lamb showed agglutination at 1:10 after injection until the sixteenth day, when it rose to 1:25, where it remained until the injection. The 10 c.c. animal showed agglutination at 1:10 for the first time on the ninth day, raised to 1:25 on the sixteenth day, where, with the exception of a doubtful reaction, it remained until the injection.

It ought to be added that the culture used here as vaccine had phenol added to it only 24 hours previous to the time it was used. This, as shown by a later experiment, is not a sufficient time to destroy the organism, and consequently it is probable that this experiment does not show the true difference between a dead and a live organism as it was intended, but shows only the difference between a live organism used a vaccine and one in which a part of the organisms have been destroyed by phenol.

DISCUSSION

It is very evident that our work with rabbits was so limited as to be of little value on which to form conclusions, but the indication was that the vaccines as we used them only rendered animals more susceptible to the organism. The use of a live

organism in rabbits would be very difficult, owing to the extremely small lethal dose for that animal. This has not been tried.

In sheep, while it is probable that the lethal dose would have to be determined for every strain from which vaccine is to be prepared, yet it is our experience that it takes a large amount of a *Bacillus ovisepticus* culture to destroy sheep when administered subcutaneously. We therefore feel that within reasonable limits, such as ought to prevail in every laboratory, the administration of the live *B. ovisepticus* as a vaccine should not be fraught with any considerable danger. We are aware that Miessner and Schern destroyed sheep with just a few loopfuls of the organism, but after working with a large number of strains we have not been able to find one that had any such virulence.

While our work needs confirmation, and there are many problems yet to be settled, we are of the opinion that the present indication is toward the use of a live organism as vaccine, and the abandonment of the dead organism, whether it be killed by heat or antiseptics.

SUMMARY

It appears from the experiment here shown that the strains of *Bacillus ovisepticus* used by us gave little protection, if any, in either rabbits or sheep when the organisms were destroyed by heat.

It is further indicated that destruction by phenol destroys a large proportion of their immunizing power.

It does seem that the organism when used in considerable amounts and used alive gives some protection to sheep against lethal doses following and also as measured by the agglutination test.

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TENDENCY OF ORGANISMS OF THE PASTEURELLA GROUP TO LOCALIZE

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THE frequent observation of the occurrence of arthritis in fowls autopsied, the history of whose cases suggested fowl cholera of an acute or subacute character in the flock at a previous time, led us to make careful study of all such birds when received at the laboratory. The records now include a great many such, and a study of the literature seems to justify this article.

Hutyra and Marek state that "bipolar bacilli manifest a particular affinity towards certain organs and therefore pathological changes develop in the less acute cases only in certain organs. In such predisposed organs either acute or chronic inflammations may be present. The serous membranes of the joints and tendons, and probably the liver, are the favored organs. Sometimes one or more joints of the wings or feet swell, later the swelling bursts, whereupon a caseous, purulent mass containing bacilli is discharged from the joints. The arthritis interferes to a great extent with the movements of the already weakened birds."

Frohner and Zwick record the occurrence of many cases of swollen articulations filled with purulent, caseous or calcareous material. Lignières makes mention of the common occurrence of the condition. Willach and Sticker observed in the intestines, lung and liver of fowls caseous nodules containing bipolar organisms. They state that in this form of the disease there are few if any organisms in the blood stream. Our own observations of many cases are the same.

Chickens usually less than one year old suddenly become lame with considerable swelling of the articulations of the affected leg or legs. Those thus affected show progressive sickness, usually terminating in from a few to fourteen days in death. A few recoveries were reported in one flock. In very young chickens the disease processes extended most rapidly. In older birds there is variation, but the extension of the disease is always slower. In from one to three days lameness becomes such

as to make it impossible for the birds to walk. Atrophy of the leg muscles ensues, and mechanical injuries, resulting in necrosis of the skin of legs and breast, occur. The legs often assume unnatural positions, being greatly extended forward or backward, tensed and stiff, and difficult to flex when force is applied. The birds are unable or unwilling to attempt to move, and the picture presented in this later stage is one of paralysis and the condition is usually so diagnosed by the owner. Swellings of the joints are usually noted at the time lameness is apparent, and are more pronounced in the early stages, subsiding as the disease progresses. The swellings are usually found in the region of the tendon above the tibio-tarsal articulation, occasionally in other joints.

Aside from the changes noted on external examination, the lesions found on autopsy consist of abscess formation usually close to or in one or more of the joints of legs or feet. In one fowl in addition to abscesses in the joints there was one at the anterior portion of the gizzard. Most of the abscess formations around the joints are peculiar in that they are not well walled off. They show little necrosis of the surrounding tissues; the contents are hard and plug-like and of a yellowish, chicken-fat appearance. When the surrounding tissues are incised the contents are easily expressed entire. A few abscesses contain a thin, watery, flocculent, dirty fluid with evident necrosis of the tissues. If the articulations themselves are affected their surfaces are somewhat eroded and the fluid content is yellowish and opaque.

Bacteriological examination by direct smears is usually negative as regards the finding of characteristic bipolar organisms, but planting in every case gave a growth of a pure culture of *Pasteurella aviseptica,* as proven by subsequent cultural tests and animal inoculation.

In two other species of animals besides the fowl we have observed localization of infection by the bipolar organism, namely, in the horse and the sheep. A four-year-old mare was being used for the production of antiserum against *Pasteurella boviseptica.* Following each of the injections of large quantities of culture of the organism, lameness and swelling of the left stifle joint occurred. After two or more months' attempted immunization of the animal a large injection of the organism killed her, and upon autopsy the affected joint was found filled with a

gelatinous fluid from which bipolar organisms highly pathogenic for rabbits were recovered.

A 24-hour-old lamb from a flock of sheep in which a number had died from hemorrhagic septicemia showed marked symptoms of the disease. It was treated with hemorrhagic septicemia antiserum and recovered. During the summer after the lamb had grown to a size of 40 or 50 pounds it was found dead in the field. At autopsy the only lesion found was a growth on the right auriculo-ventricular valve the size of a hazelnut. Direct smears from the contents of this nodule showed many characteristic bipolar organisms which were recovered in culture and which proved highly pathogenic for rabbits.

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DR. BALDWIN INJURED

With his sedan automobile practically smashed beyond repair and himself considerably bruised about the body and his left leg broken below the knee, Dr. A. F. Baldwin of Montana narrowly escaped with his life when a Northern Pacific passenger train crashed into his machine.

Doctor Baldwin declares he did not hear any warning whistle from the approaching train and believes the engineer did not see him. It is related that after the train passed a passenger in one of the coaches noticed the wreckage of the automobile and called the conductor's attention to the matter, the latter signalling for a stop, when the doctor was picked up and brought immediately into the city and taken at once to the hospital where medical attention was given.

DR. DALRYMPLE GIVEN FORD SEDAN

As a token of the esteem and affection in which he is held by members of the faculty, the experiment station and the extension staffs, Dr. W. H. Dalrymple was presented with a Ford sedan as a Christmas gift by these coworkers. The car was fully equipped in every detail, even to the 1922 license plate. The fund for this purchase was raised among the University people through the efforts of Prof. E. L. Jordan of the College of Agriculture and Mr. C. E. Woolman of the extension division.

THE RELATIVE VALUE OF TREATMENT AND PROPHYLAXIS IN THE CONTROL OF PARASITIC DISEASES [1]

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SO FAR as the practicing veterinarian is concerned, all the training of the veterinary course looks forward to diagnosis, treatment and prophylaxis. The veterinarian must recognize diseases for what they are, must be able to cure them if curable, and must know the measures for limiting their spread and recurrence. This paper is a consideration of the comparative values of treatment and prophylaxis in connection with parasitic diseases.

Some of the parasitic diseases are readily amenable to treatments now known to us, and others are not amenable to any treatment known at present. Some of the parasitic diseases are easily prevented on the basis of our present knowledge, and others are not easy to prevent because our knowledge of the life history of the parasite is inadequate or the measures indicated on the basis of a known life history are not feasible. Where we have a satisfactory treatment for the removal of a given parasite which we can not control by prophylactic measures, treatment becomes a more important measure than prophylaxis. Treatment is essentially the field of the veterinarian. Where we have simple prophylactic measures for the control of parasites not at present amenable to any known medication, prophylaxis becomes a more important measure than treatment. The carrying out of prophylactic measures is essentially the field of the stockman and farmer; the function of the veterinarian as regards prophylaxis is mostly advisory, though sometimes regulatory. Where we have satisfactory treatments and prophylactic measures for a given parasite, both treatment and prophylaxis are important, one supplementing the other, and both should be used. The sick animal needs treatment first and prophylaxis second; the well animal needs prophylaxis that treatment may not be needed. Where we have neither satisfac-

[1] Presented at the fifty-eighth annual meeting of the American Veterinary Medical Association, Denver, Colo., September 5-9, 1921.

tory treatments nor prophylactic measures, we are in rather a bad way from the standpoint of the practitioner, and of the stockman and farmer, and can only console ourselves with the reflection that the things we don't know are the ones which furnish occupation to the investigator.

PRINCIPLES OF TREATMENT AND PROPHYLAXIS

Certain principles may be laid down with reference to the value of treatment and of prophylaxis in the case of any given parasite. These principles may not be of universal application or may be of variable application. Things which are feasible in the city may not be feasible in the country, or vice versa. What a European veterinarian would regard as feasible might appear entirely impracticable to an American, and the converse might also be true. With this limitation in mind, however, the principles in regard to treatment may be stated as follows:

Only those parasites which are accessible to known medicinal medication or surgical measures may be controlled by treatment, and the treatment must be effective and practical, not too elaborate or expensive.

The principles in regard to prophylaxis may be stated as follows: We must know, or be able to surmise rather definitely, the life history of the parasite, and where the parasite is ingested by the host we must be able to control the food habits of the host, without a resultant loss, financial or otherwise, more serious than that arising from the presence of the parasite.

DISCUSSION OF PRINCIPLES OF TREATMENT

Before attempting to apply these principles to specific worm infestations, they may be examined in detail, beginning with those in regard to treatment. Exactly what is meant by parasites accessible to medication is a thing which requires some consideration and careful statement. What is apparently inaccessible in the light of yesterday's knowledge may be evidently accessible today; what is apparently inaccessible today may be accessible tomorrow.

There are certain anatomical regions which appear on first sight to be accessible to anthelmintics, and experience shows that these regions are as accessible as they appear to be. Thus the lumen of the entire digestive tract of the horse is now known to be accessible to anthelmintics, and excellent results may be

obtained against practically any worm parasite of the horse which occurs in the lumen of the digestive tract, by the use of two drugs, carbon bisulphide and oil of chenopodium, by mouth.

The lumen of the digestive tract of the dog is also accessible to anthelmintic medication, though the entrance of a given dose of a drug into the cecum can not be guaranteed. In the case of the horse the fact that the cecum has two openings insures the entrance of a drug into this organ if the drug passes the ileo-cecal valve. In the case of the dog a drug may pass the ileo-colic valve and proceed down the colon without entering the cecum. This conclusion is based on the anatomical structure, the small size of the cecum, and the fact that in the great majority of cases a given anthelmintic will not remove whipworms, but many of these anthelmintics will occasionally remove some or all of the whipworms present. Since repeated doses of suitable anthelmintics will in a reasonable time enter the cecum of the dog and remove the worms present there, we may consider the cecum of this animal as accessible to medication. In the case of swine, experiments show that the lumen of the stomach and small intestine is accessible to anthelmintic medication.

At present we have little evidence in regard to the accessibility to anthelmintics of the cecum and large intestine of swine, but there is little reason to suppose that these will prove inaccessible. In ruminants the lumen of the stomachs is accessible to anthelmintic medication, and the work of Lewis and Guberlet at the Oklahoma Experiment Station indicates that the small intestine will prove likewise accessible. As yet we have little knowledge as regards anthelmintic removal of worms from the cecum and colon of these animals. Brumpt has used rectal injections of thymol against whipworms in the cecum of sheep, but the administration of this treatment according to the technique he gives would not appear practical or feasible to the American veterinarian and would hardly appear to be warranted on a balance of the time and cost of treatment against the benefits received. However, we have every reason to suppose that satisfactory treatments for worms in the large intestine of swine will be developed.

Outside of the lumen of the intestine, parasites appear to be accessible to anthelmintic medication in the case of certain blood-sucking parasites in the bile ducts. Thus male fern and some of its components have been found effective against the common

liver fluke of sheep. That this efficacy is apparently associated with the blood-sucking habit is indicated by the fact that the small lancet fluke of sheep, which is not a blood-sucking form, is not affected by the same treatment, in spite of the fact that it also lives in the bile ducts, often in association with the common liver fluke.

Some worms in the blood vessels are amenable to anthelmintic medication. The outstanding examples of this at present are the human blood flukes, which have proven amenable to intravenous injections of tartar emetic. The nematodes in the blood stream do not at present appear to be equally amenable, but it appears as reasonable to suppose that some suitable drug will be found as to suppose that such a drug will not be found.

Locations which at present appear to be inaccessible to medication include the mucosa and submucosa of the digestive tract, most connective tissue except the subcutaneous, which can be reached by hypodermic medication, hepatic and pulmonary cysts, the kidneys and the body musculature. Theoretically, effective drugs may be found and put in effective contact with parasites in some of these locations by way of the blood stream, but such treatments have not yet been devised.

Among the locations which are accessible to treatment, but in which treatment is not usually satisfactory or effective, the air spaces of the lungs deserve mention. There are numerous treatments for lungworms and it is not difficult to inject drugs intratracheally in such animals as sheep, cattle and horses. However, experience does not indicate that these injections usually affect the worms in the lungs very seriously, whereas the effect on the host animal is sometimes injurious. Experiments by Gilruth in New Zealand have indicated that better results were obtained by nursing treatment without medication directed against the lungworms than were obtained by various kinds of medication. Some time ago Herms and Freeborn at the California Experiment Station recommended the injection of chloroform into the nostrils of animals suffering from lungworms, but the investigators in question noted that the worms were not killed by the treatment. They claimed good clinical results, but Fitch has recently stated that he has tested this treatment and not found it effective. The lungs are likewise accessible to fumigants, and many of these, such as sulphur dioxide, have been recommended for use against lungworms, but the

results do not appear to be very satisfactory and the treatment appears to be even more dangerous as a rule than intratracheal injections. At the present time the lungs must be regarded as accessible to medication, but it appears that suitable medication, capable of killing the worms without injury to the host animal, remains to be developed.

As regards the principle that treatment must not be too elaborate or expensive, it is sufficient to say that drugs used must not be too expensive, apparatus too elaborate, or technique too elaborate, cumbersome or tedious.

DISCUSSION OF PRINCIPLES OF PROPHYLAXIS

In the same way we may examine the principles set forth in regard to prophylaxis. As stated, we must first know or accurately surmise the life history of a parasite before prophylaxis of a rational sort is possible. There are many life histories we do not know. Among these are the life histories of the anoplocephaline tapeworms of horses, sheep and cattle. Until we know these life histories, prophylaxis is mere surmise for the most part, and in covering the apparent possibilities we are apt to waste energy on useless measures. There are many life histories which we surmise at present, but surmise is often dangerous. Thus we assume that in a general way all the trichostrongyles in the stomach and intestines have much the same life history, but investigations may prove that we have assumed too much and that we are in error. Recently Rodenwalt and Roeckemann have stated that the biology of the helminths is a realm of surprises, "Die Biologie der Helminthen ist ein Gebiet der Ueberraschungen," and the recent developments in the study of the life history of ascarids, the broad fish tapeworm, the human pinworm and other worms afford striking evidence of this fact. We must be alert to reject the absurd and yet keep an open mind as to the possibility of the improbable and seemingly fantastic.

Where we do know the life history of a parasite, the indicated prophylaxis all too frequently falls in the category of measures involving more loss or having more objections than the existence of the parasite itself. Thus we may say that the indicated prophylaxis to protect cats from becoming infested with the common cat tapeworm, *Taenia taeniaeformis* (*T. crassicollis*), is to prevent cats from catching and eating rats and mice. But the

catching of rats and mice, which usually involves the eating of these rodents, is the sole reason for maintaining cats in many cases. To prevent ducks and geese from becoming infested with certain tapeworms it is only necessary to prevent their eating the water fleas and other small crustaceans in streams and ponds, but these crustaceans are of common occurrence in the customary food supply of these birds, and in default of serious consequences following the presence of these worms most owners would prefer to allow the birds to continue in their usual feeding habits and acquire some tapeworms. Which case brings up the important idea of the control of food supply as a factor in prophylaxis for the control of parasitic diseases.

In the case of man, the increase in knowledge of disease has gone hand in hand with sanitation. Sanitation has been dovetailed with certain habits of the human animal. Man is the only animal that cooks his food and distinctly separates his culinary arrangements and his sanitary arrangements. This sterilization by cooking and the separation of all that appertains to metabolic intake from all that appertains to metabolic waste are fundamental. We can approximate these conditions for some of our domesticated animals. Under favorable conditions we can feed our dogs and cats on cooked meats in clean receptacles and educate them along lines of cleanliness in disposing of metabolic wastes. We can raise pigs under conditions approximating cleanliness. But where herbivores, such as the horse, cow and sheep, must be run on pasture to utilize the vegetation which makes up the bulk of their feed, the situation is different. These animals feed on pastures and pass their manure on these pastures. In other words, they continually soil their table with feces and with the fecal content of parasitic worm eggs and larvæ. This is unavoidable for the most part.

Numerous measures have been devised for diminishing the injury resulting from this habit. Pasture and stock rotation are two of the more important of these measures. In simple pasture rotation animals are moved from one pasture to another from time to time, the unused pasture being left fallow as a rule. Its applicability is limited by the fact that it calls for more pasture than is oftentimes available to make it effective in preventing worm infestation. Worm eggs often develop to the infective stage, or their embryos hatch and develop to the infective stage, in the course of a couple of weeks. Theoretically

stock should be moved to fresh pasture, or pasture which has not been used by the same kind of stock for at least a year, every two weeks during the season when worms develop this rapidly, to prevent infestation with such worms. In actual practice this requires more grazing area than is usually available. To be sure, the period of rotation may be lengthened under these conditions and benefits still secured from the rotation, but the benefits diminish as the period lengthens. A second objection is that such a system of pasture rotation calls for a relatively large amount of fencing, and fencing is expensive. A third objection is that a system of pasture rotation calls for considerable attention and thought on the part of the farmer and stockman. It is not a thing that can be attended to once or repeated as a simple routine, but is a thing that requires planning and attention at rather frequent intervals. Usually the farmer and stockman is too busy with other matters and often too tired physically when the day's work is done to make or follow up plans of this sort.

The time limitations of such a rotation plan are rather rigid. Parasite eggs and infective larvæ are quite resistant, and even with the lapse of a year a pasture can not be regarded as entirely safe or free from worms. Its status has improved, but the total destruction of the worm infection can not be assumed. And since it seldom happens that one can follow up the theoretical ideal of a movement to fresh pastures every two weeks throughout warm weather and a return to old pastures at the end of a year, in actual practice stock must be moved less frequently and returned to old pastures before the end of a year, and often much before the end of a year. The more slowly they are rotated and the sooner and oftener they return to old pastures, the less effective this mode of control becomes.

Such a system of pasture rotation may be modified by plowing up and planting pastures after use, and this will bury and destroy numbers of eggs and larvæ, improving the value of the system as a method of parasite control. But it is not always feasible or advisable to plow under a pasture for this purpose, and to the extent that it is not feasible or advisable this method of control must be regarded as inapplicable and of limited practical value.

Stock rotation is essentially only a modification of pasture rotation, but it may be a highly important modification and it

appears to be a more useful and valuable procedure. In general, ruminants, horses and swine may follow one another with little danger from one another's parasites, as these three groups of animals have few parasites in common. In addition there is probably a cleansing of the pastures, so far as parasites are concerned, as the result of such a rotation system. While we have yet too little evidence of a definite sort on this subject, it is quite probable that the parasites taken up by unsuitable hosts are frequently destroyed in such hosts, thereby definitely diminishing the amount of infestation present on the pasture. Such a system of stock rotation lessens the need of plowing up pastures and so makes it possible to conserve permanent pasture without the attendant danger from the permanent pasture carrying only one kind of stock. It also makes it possible to utilize these pastures up to their full capacity for feed without the loss from pastures lying fallow and unused. It does not require as much land as a system of simple pasture rotation, and fewer fields mean less fencing. It does, however, have the limitation that it can not always be applied, since many farms do not carry two or three kinds of livestock and seldom carry them in anything like the same amount as regards pasture requirements.

Although pasture and stock rotation are extensively recommended and deserve to be used wherever feasible and applicable, the limitations of these systems are fairly evident. Eradication of parasitic worms by such systems would evidently be a long and tedious task. We can obtain some light on the probable value of these systems by a consideration of the history of the warfare on the Texas fever tick. For many years pasture rotation methods for the slow destruction of the fever tick by starvation were given the same emphasis as were dipping, hand-picking and other measures aimed at the immediate destruction of the tick. As time went by and theory was given the acid test of practice, the emphasis changed. The final slogan of the tick campaign became "Dip that tick!" not "Starve that tick!" In other words, direct action on the field of battle won out against the idea of the food blockade. It is a principle of warfare that an active offensive is often the best line of defense, and this principle appears most promising in the warfare against worms.

At the experiment station of the Zoological Division of the Bureau of Animal Industry at Vienna, Virginia, the routine

use of the 1 per cent solution of copper sulphate every month throughout the year against stomach worms in sheep has proved an astonishingly satisfactory control measure. Pasture rotation alone allows the worms to remain and make provision for the perpetuation of the species with only the limitation that such rotation sets upon the welfare of the eggs and larvæ on the pasture. Treatment attacks the enemy in his own territory and at his base of supplies. It destroys the worms in large numbers, and as soon as the infested animal is again ready to withstand treatment it attacks again. So far as we can judge in this case, and it applies to similar nematode infestations in all herbivores, what has proven true in the case of the tick will probably prove true in the case of the nematode worms amenable to treatment in the animals that feed on pasture. We shall probably come in time to the slogan "Kill the worms!" rather than "Starve the worms!" It is not intended to decry pasture rotation. Pasture and stock rotation should be used wherever feasible, but as a supplement to treatment, wherever treatment is possible, not as a substitute for treatment.

Owing to the fact, already noted, that the herbivores soil their table with their feces, treatment is apparently always necessary whenever worm infestation exists and treatment is known. It is the primarily essential measure. If prophylaxis is possible, prophylactic measures should be used in addition, but as a single control measure treatment of proved value is superior to prophylaxis for these infestations in these animals.

In human medicine preventive medicine is fast coming to the front and threatens in time largely to supplant individual treatment, but in veterinary medicine, owing to the nature and habits of our domesticated animals, treatment of sick animals promises to be the most essential measure, so far as parasites are concerned, for many years after preventive medicine outstrips treatment among human beings. The practicing veterinarian can look forward with confidence to being an essential element in the control of parasitic diseases for many years, regardless of whether the practicing physician is meanwhile supplanted by the public health officer.

In passing it may be said that, so far as the parasitic diseases are concerned, treatment is prophylaxis. The destruction of adult parasites constitutes an interruption to the life cycle quite as definite as the destruction of larval forms and intermediate

hosts or the provision of conditions unfavorable for such larvæ or intermediate hosts.

THE APPLICATION OF THESE PRINCIPLES

With these principles in mind we may now proceed to consider briefly some of the more common parasitic diseases of our livestock with reference to the present status of treatment and of prophylaxis in particular cases. It is not intended to cover these subjects in detail, but only along broad lines.

Parasites of the Horse

Bots.—We have at present a quite satisfactory treatment for bots in the use of carbon bisulphide in hard capsules in doses of 6 drams given without purgation. This treatment should be given in the fall, for choice, after the adult flies have disappeared, to protect the horse from the effects of the bots during the winter and spring. Knowing the life history of the flies, and knowing that they deposit their eggs on the horse, measures to prevent egg-laying during the summer should be used wherever feasible. Some of the measures advocated do not appear feasible or practical. It has been suggested that horses be kept in the stable during the day and turned on pasture at night when the insects are not flying, but for the most part horses are needed for work in the daytime and such a prophylactic system presupposes a life of leisure that is not led by most horses. Clipping a horse to prevent the flies laying the eggs on the hairs has been recommended and may be a useful measure under certain circumstances. The use of kerosene or phenols on the manure to destroy bots passed after treatment has also been recommended. This is a waste of time and money. If carbon bisulphide is used, the bots will be dead; if anything else that will not kill bots is used, there will be no bots to kill in the manure. The application of fly repellents to horses has also been recommended as a control measure. Unfortunately, we have nothing as yet which approximates an ideal fly repellent. Water emulsions, such as the coal-tar products, are cheap and easily applied, but the effects are transient. Repellents made up with oily or fatty bases are usually objectionable on the score of dirtiness, though they are usually more lasting in repellent effect. Mechanical protection by means of fringes, muzzle baskets and other devices are sometimes used and some of these afford a fair measure of protection.

Ascarids.—The same treatment that is effective against bots is also effective against ascarids. Prophylaxis is not difficult in the case of stabled animals not on pasture. The manure carrying the ascarid eggs can be disposed of properly. Prophylaxis is not readily applicable in the case of animals on pasture, and here treatment must be depended on as the primarily important thing.

Strongyles.—The case of these worms is similar to that of the ascarids. We have an effective treatment in the administration to animals fasted 36 hours of 4 to 6 drams of oil of chenopodium, followed immediately by 1 to 2 pints of linseed oil or an aloes ball. Proper manure disposal is prophylactic for stabled animals, but treatment is feasible and prophylaxis is not feasible in the case of pastured animals, except where stock rotation is possible.

Habronema.—Owing to the fact that these worms live in the mucosa of the stomach as well as in the lumen, no treatment is known at present that will remove all of the worms present. On the other hand, some species have an intermediate stage in the ordinary horsefly, and these flies breed for the most part in horse manure. The most favorable conditions for breeding are in the piles of manure about the yards and stables rather than in the manure scattered about the pastures by horses in grazing. Hence control measures in the way of suitable handling and disposal of manure are feasible, and at the present time prophylaxis is of more importance in the case of these worms than is treatment.

Pinworms.—As these worms are readily removed by the use of chenopodium as given to remove strongyles, and as prophylaxis has the same difficulties as in the case of the ascarids and strongyles, treatment is a matter of primary importance in the case of these worms.

Tapeworms.—So far as the tapeworms of the horse are concerned we have so little definite, well-established information in regard to treatment and are so much in ignorance as regards their life history that both treatment and prophylaxis must be regarded as problems for investigation.

Flukes.—Flukes are of little importance as parasites of the horse in this country. Treatments have been established for some flukes in other animals and could doubtless be adapted to the horse if necessary. Prophylaxis is known and to some

extent practical and will be discussed in connection with other host animals.

Parasites of Cattle

Ox warble.—Treatment for ox warbles is surgical in nature and is a feasible and practical affair. The removal of the warbles from the back and their destruction relieves the animal of its parasites and, like other treatments, is of value as prophylaxis in diminishing the supply of the parasites in the future. Purely preventive measures have been investigated by Imes and Schneider of the Bureau of Animal Industry, who have found the use of wading tanks containing insecticidal and fly-repellent solutions for wetting the legs below the hocks and knees of considerable value in protecting cattle from warbles. They recommend a 2 per cent solution of a coal-tar creosote dip.

Stomach worm.—For reasons already discussed, cattle on pasture—and this is especially true of young animals—can be treated for stomach worms at intervals of a month to more advantage than they can be protected from these worms by prophylactic measures applicable to the average farm. Where animals are kept up and fed from racks, ordinary cleanliness is an applicable prophylactic measure.

Hookworm and nodular worm.—Prophylactic measures are difficult to apply in the case of these parasites, as in the case of most nematodes of the digestive tract where animals are on pasture. The situation is further complicated by the fact that cattle doubtless are infested cutaneously by hookworms, as other animals are known to be. Treatment is still a matter for investigation. In the case of the sheep hookworm, Lewis and Guberlet report excellent results from the use of a solution containing 1 per cent copper sulphate and 1 per cent tobacco. The same treatment may prove of value in the case of cattle. So far as nodular worms are concerned, a treatment remains to be developed. The larval worms in the nodules must be regarded as inaccessible to treatment at the present time, and we have yet to find a satisfactory treatment for the adult worms in the lumen of the large intestine.

Tapeworms.—Our ignorance of the life history of these worms precludes our formulating definite prophylactic measures for their control. As regards treatment, we find that the repeated administration of the copper sulphate treatment materially diminishes the number of tapeworms present, and Lewis and

Guberlet report the removal of 75 to 100 per cent of these worms by the use of the copper sulphate and tobacco solution noted above in connection with hookworms.

Flukes.—Both treatment and prophylaxis appear to be of value in the control of the common liver fluke. European investigators report good results from the use of male fern and its components in repeated doses in removing these worms. Prophylaxis is based on the known life history and the fact that snails act as intermediate hosts. The avoidance of wet pastures or the filling and draining of such pastures to render them unfavorable for the development of snails are indicated measures. Another control measure recommended by Chandler consists in the destruction of snails by the addition to standing water, or streams, of copper sulphate, approximately 1 part to 1,000,000 parts of water, or 1 ounce of copper sulphate to 7,800 gallons of water.

We have as yet no treatment for the large liver fluke in cattle. Prophylaxis is the same as for the common liver fluke.

Parasites of Sheep

Grub in the head.—In the case of this parasite, radical treatment consists in surgical measures, trephining to open the nasal sinuses and the removal of the grubs. This is a rather elaborate procedure for the parasite involved and in most cases seems unwarranted on the basis of cost in comparison with damage done by the parasite. Fumigation and other measures designed to cause the removal of the grubs by sneezing can hardly be expected to remove many of the grubs, and fumigation with sulphur dioxide is dangerous. On the other hand, a simple prophylactic measure, consisting in smearing pine tar on the nose of the sheep to prevent the fly from attacking, appears to be satisfactory in actual practice. By putting this tar in holes bored in planks or along a V-shaped trough and putting salt in the holes or the trough, the process can be made practically automatic, thereby saving the labor of applying the tar and renewing it. In this case, prophylaxis appears to be more important and feasible than treatment.

Stomach worm.—The case of this parasite has already been covered. Treatment once a month with the cheap copper sulphate solution is a rapid and effective control measure. The commonly recommended prophylactic measure, pasture rotation,

is a valuable aid where it is applicable, but it is rarely applicable under the conditions where it is most needed. On the range country of the West it is more or less applicable, but the dry western range is itself not favorable to stomach-worm development, and the losses from this source are usually on the more valuable soil in the moister climate of the East, Middle West and South, and the value of the land is here correlated with limitations on the amount of pasture available for rotation.

Hookworm, nodular worm and tapeworm.—What has been said of similar parasites in the case of cattle applies here for the most part. Prophylaxis is difficult in the case of the nematodes and unknown in the case of tapeworms. Treatment for nodular worm remains to be developed. The treatment for hookworm and tapeworm by means of the copper sulphate and tobacco solution is indicated, and as this is also a treatment for the removal of stomach worms, the use of such a treatment monthly throughout the year, or at least during the spring, summer and fall, will serve the purpose of controlling all these worms.

Flukes.—This subject is covered in what has been said of flukes in cattle.

Parasites of Swine

Ascarids.—In the case of these worms we have adequate treatments and have recently learned something of the efficacy of a simple prophylactic system. Treatment with oil of chenopodium accompanied by an adequate purgative is quite effective, though the farmer is still searching for a treatment which can be given satisfactorily in the feed. Anyone who has handled a large, noisy hog will appreciate the farmer's position in the matter and will be pleased to see some such treatment developed. At present we are forced to observe the nice balance between the amount of poison that will kill worms without killing hogs and the amount that will kill hogs also, by means of fasting and appropriate individual doses.

The prophylaxis which has been developed by Dr. Ransom and Dr. Raffensperger is the so-called McLean County system. This system is primarily designed to protect the young pig, since pigs are much more easily infested during the first months of life and suffer more severely from the effects of worms at that time. Under the McLean County system, sows are carefully washed to remove dirt and adherent worm eggs and put into

thoroughly cleaned farrowing pens just before farrowing. Within two weeks after farrowing the sow and pigs are removed from the farrowing pen to clean pasture which has been cultivated and sown to forage crops, and are kept there away from other swine for a period of about four months. After this time they are much more resistant to infection by worms and to the results of worm infestation, though the protection which is afforded by cleanliness about the hog yard should be given them. This system has been very satisfactory in protecting pigs from ascarid pneumonia, thumps of verminous origin and the effects of ascarids in the digestive tract. Treatment will be necessary for swine ascariasis for many years, and is indicated wherever infestation occurs, but prophylaxis of a simple and practical sort promises to be an increasingly large factor in the control of this disease.

Kidney worm.—The kidney worm occurs in the perirenal fat and in the liver for the most part, and hence in places not accessible to treatment by any method known at present. The life history, according to those who have worked on this subject, is as follows: The eggs of worms in the perirenal fat pass through fistulous tracts into the ureters and out in the urine, the urine, and not the feces, being the source of renewed infestation in this case. The eggs hatch and give rise to larvæ which may enter the pig by way of the skin or by way of the mouth. Those larvæ entering by way of the skin arrive in the perirenal fat, in a position to carry on the life cycle, while those entering by way of the mouth arrive in the liver, apparently going astray and leaving the path which makes it possible to carry on the life cycle. Since the urine is the source of infestation, and since the skin is the normal point of attack for the larvæ, the hog wallow must be looked upon as the place where infestation is most likely to take place. The evident prophylaxis appears to be the substitution of a sanitary concrete wallow for the old mud-hole. Into this wallow one may put cresol compounds which will destroy the worm larvæ as they hatch, and the same compounds will aid in controlling external parasites of swine.

Parasites of Dogs

Ascarids.—We have adequate treatments for ascarids in dogs. Chenopodium given with a suitable purgative is quite effective, and carbon tetrachloride appears to be a promising drug for

removing these worms. Prophylaxis is a matter of sanitation and cleanliness. It is applicable in the case of the household pet, if the owner of the dog cares to apply it. It is not equally applicable in the case of the sheep dog, the hunting dog, the watch dog and other dogs which have to live out of doors where they are not subject to the same oversight and care. However, the application of sanitary measures in the case of pups, comparable to the measures utilized in the McLean County system in the case of swine, would doubtless tide the pups over the worst danger period.

Hookworms.—The work done up to this time with carbon tetrachloride indicates that in it we have at last a drug capable of removing the hookworms of dogs and doing so without appreciable injury to the dog. If it lives up to its promise it will go a long way toward doing what the Rockefeller Foundation calls "unhooking the hookworm." In passing it may be mentioned that the first reports coming in on the use of this drug for removing hookworms from foxes are very favorable as regards both efficacy and safety. As in the case of the ascarid, prophylaxis in the case of the dog hookworm depends largely on the control we have of a dog's habits. Control may be quite complete in the case of a lap dog or house dog, or quite inadequate in the case of the hunting dog and other dogs mentioned. For the latter groups of dogs treatment appears to be the important thing. What has been said in regard to protecting pups from ascarids applies also in regard to protecting pups from hookworms. The young animals are the most susceptible and suffer most from them.

SUMMARY

The relative value of treatment and prophylaxis in the case of parasitic diseases may be ascertained by the application to a given case of certain elementary principles. A treatment or a prophylactic procedure must be effective and practical.

Where the application of these principles indicates that treatment is feasible and prophylaxis is more or less theoretical and impractical, we should devote our attention to treatment and make prophylaxis a secondary matter, using it so far as it can be used, but not depending on what experience shows to be undependable.

Where prophylaxis is feasible and treatment unknown or unsatisfactory, prophylaxis is always in order, since it is the

ounce of prevention which weighs more than the pound of cure.

As regards the present status of some of the more common parasites of our domesticated animals, we find on examination the following:

Treatment appears to be more practical and satisfactory than prophylaxis in the present state of our knowledge and under present conditions for the control of bots, ascarids, strongyles and pinworms in horses, of stomach worms, hookworms and tapeworms in cattle and sheep, and of ascarids and hookworms in dogs which live and work out in the fields.

Prophylaxis appears to be more practical and satisfactory than treatment in the present state of our knowledge and under present conditions for the control of *Habronema* in horses, the large liver fluke of cattle, grub in the head in sheep and kidney worm in swine.

Treatment and prophylaxis are both important and valuable for the control of ox warble in cattle, the common liver fluke in horses, cattle and sheep and ascarids in swine.

Neither treatment nor prophylaxis is satisfactory in the present state of our knowledge in the case of tapeworm in horses and nodular worm in cattle and sheep.

The foregoing findings may be modified under given conditions. Thus prophylaxis against ascarids and hookworms in pups might be made of primary importance.

NEW FILM "EXIT ASCARIS" WELL RECEIVED

The American Association for the Advancement of Science and affiliated organizations witnessed the first public showing of the motion picture "Exit Ascaris" at a meeting held in Toronto, Canada, December 29. The film, which shows in story form the practical application of a method devised for controlling roundworms in swine, received the warm approval of the scientists.

Dr. B. H. Ransom, Bureau of Animal Industry, who developed the method for roundworm control, accompanied the motion-picture presentation with a short address. The new film is especially applicable for showing in the Corn Belt and other important hog-growing regions.

TUBERCULOSIS IN A SHETLAND PONY [1]

By B. A. BEACH, F. B. HADLEY *and* H. B. PIPER
Wisconsin Agricultural Experiment Station, Madison, Wisconsin [2]

THAT TUBERCULOSIS is a disease which occurs very infrequently in American horses is shown by the fact that only five cases have been found recorded in our veterinary literature. None of them appears to have been in a Shetland pony. One of these cases was reported by Shigley (1), another by Fink (2), two by Pickens (3) and one by Barnes (4).

A considerable number of cases of equine tuberculosis have been reported from various countries of continental Europe, while 43 cases have been recorded by Hoare (5) as occurring in the British Isles between 1888 and 1911. An analysis of these cases shows that 18 were cart horses, 10 harness horses, 2 well-bred animals, 1 troop horse, 1 Belgian stallion, 2 ponies, 1 cob, 1 Hackney yearling, and 7 horses the breed of which was not stated.

Since only two ponies are included in the above lists, the writers feel that the case to be described is so unusual that it warrants recording, more especially because Koch's rules to prove the specificity of the disease have been satisfied.

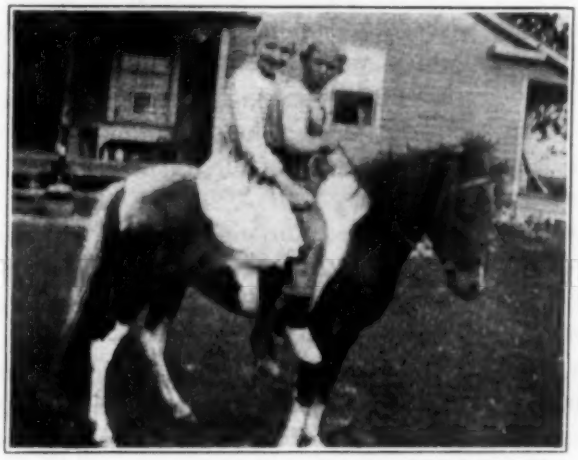
The subject was a Shetland pony, six years of age, that had been kept for the two years previous to her death as a children's pet. A very good idea of her size may be had by comparing her with the children astride her back, as shown in the accompanying photograph. The farmer who raised this pony and owned her during the first four years of her life stated that her dam is still alive and apparently healthy. None of the dam's other progeny has ever shown symptoms of any infectious disease. He also said that the pony had not been fed cow's milk while a foal or afterwards. It was learned that the last owner had tuberculosis in his herd of dairy cattle. This was demonstrated when a cow was butchered on the farm where the pony sickened and died. The carcass of this animal, when

[1] Presented at the fifty-eighth annual meeting of the American Veterinary Medical Association, Denver, Colo., September 5–9, 1921.

[2] Published with the approval of the Director of the Wisconsin Agricultural Experiment Station.

opened, was literally a mass of tubercles, all organs of both the thoracic and the abdominal cavities showing lesions. Although the pony was not directly associated with the cattle, there was plenty of opportunity for her to acquire the infection from them, both through contaminated feed and the drinking water in the common trough.

According to the last owner, the pony had been sleek, fat and in the best of health until early in the summer of 1920. At this time the animal began to lose flesh and gradually became debilitated. Even with the best of care, feed and medicinal



A Shetland pony that died of tuberculosis

treatment no improvement was made. Finally on December 23 the pony died, and one of the writers (Piper) was requested to make a postmortem examination.

This examination revealed an enormously enlarged mesenteric lymph gland which was rather ovoid in shape and measured about 8 by 10 inches. When incised it was found to be largely composed of a cheese-like material, resembling avian pus in appearance, but there was no evidence of calcification, as is the rule in cattle and in hogs. Numerous pea-size to walnut-size nodules, resembling the "pearls" of bovine tuberculosis, were observed beneath the serous covering of the neighboring intestine, the abdominal wall and the diaphragm. Adhesions had taken place between all involved serous surfaces. The spleen and lungs showed no macroscopic lesions; they were not examined microscopically.

A microscopic preparation of material from the centers of one of the small tubercles was made and stained for acid-fast microorganisms. Literally hundreds of bacilli were revealed by the aid of the microscope. This is in marked contrast to the paucity of bacilli that are found, even in very active cases, in tuberculous lesions of cattle and swine. These bacilli were rather longer than the human tubercle bacillus and were distinctly nodulated.

A cockerel was inoculated subcutaneously with 1 c.c. of an emulsion made by macerating a nodule in normal salt solution. This was done because the organism simulated the avian tubercle bacillus and we wished to establish the type or variety of the tubercle bacillus which was responsible for the original infection. Two guinea-pigs were inoculated in the same way with the same quantity of emulsion. Suitable culture media were also inoculated directly from the lesions as another means of recovering the organism.

The cockerel was observed for eight weeks, but showed no symptoms of disease during this period. It was then killed and a careful postmortem examination made, but no lesions of tuberculosis could be demonstrated.

Guinea-pig 1 gradually lost weight and died five weeks after being inoculated. At time of inoculation it weighed 520 grams and at death 409 grams. The following organs revealed lesions of tuberculosis: Lungs, liver, spleen and mesenteric lymph glands. Microscopic preparations from these organs showed the characteristic acid-fast organisms in enormous numbers.

Guinea-pig 2 weighed 555 grams when inoculated and 420 grams five weeks later when it was killed. It showed extensive lesion of the disease in the liver and spleen. *Bacterium tuberculosis* was demonstrated microscopically in the lesions.

An emulsion made from the liver of the latter guinea-pig was inoculated into a healthy guinea-pig, 3. This animal was killed 23 days later and showed tuberculosis infection of the liver and spleen.

Other inoculations were made as shown by the data in the accompanying table. Of particular interest is rabbit 1, which gradually lost weight and was destroyed 10 weeks after inoculation. Its liver showed lesions that might have been taken macroscopically to be miliary tuberculosis, but it was impossible

EXPERIMENTAL ANIMALS INOCULATED WITH TUBERCLE BACILLI OF EQUINE ORIGIN

Animal	Date inoculated	Initial weight (grams)	Source of inoculum	Method	Final weight (grams)	Fate	Lesions
Cockerel.....	Dec. 27, 1920....	?	Tubercle of pony.	Subcutaneously	?	Killed Feb. 21, 1921....	None.
Guinea-pig 1...	Dec. 27, 1920....	520	do.	do.	409	Died Jan. 31, 1921.....	Generalized.
Guinea-pig 2...	Dec. 27, 1920....	555	do.	do.	420	Killed Feb. 2, 1921....	Liver and spleen.
Guinea-pig 3...	Feb. 2, 1921....	260	Guinea-pig 2.....	do.	196	Killed Feb. 25, 1921...	Point of inoculation and spleen.
Guinea-pig 4...	Feb. 25, 1921...	470	Guinea-pig 3.....	do.	317	Killed March 29, 1921.	Liver and spleen.
Rabbit 1.....	March 29, 1921..	2,118	Guinea-pig 4.....	do.	1,935	Killed May 6, 1921....	Nontuberculous lesions, liver.
Guinea-pig 5...	May 6, 1921....	490	Rabbit 1.....	do.	541	Killed July 8, 1921.....	Nontuberculous lesions, liver.
Guinea-pig 6...	May 10, 1921...	350	Culture pig 2....	do.	293	Killed June 7, 1921....	Generalized.
Rabbit 2.....	May 10, 1921...	2,090	do.	do.	1,796	Died June 29, 1921....	Both lungs and kidneys.
Rabbit 3.....	May 10, 1921...	1,260	do.	do.	1,107	Died June 28, 1921....	Double tubercular pneumonia and left kidney.

to demonstrate the organisms microscopically. A large encapsulated abscess was noted at the point of inoculation. Guinea-pig 5, which was inoculated from rabbit 1, showed a liver studded with nodules as large as small peas and filled with caseous pus, exactly like the liver of the rabbit from which it was inoculated. No acid-fast organisms could be demonstrated microscopically. The conclusion was that neither of these animals was infected with tuberculosis, as the rabbit lost relatively little weight, while the guinea-pig gained markedly in weight after being inoculated. Moreover, the microscope failed to reveal the characteristic tubercle bacilli even after repeated search.

By comparing the pre-injection and post-injection weights of the experimental guinea-pigs, as shown in the table, it is seen that the weight curve changed characteristically. In the opinion of De Witt (7) the weight curve of guinea-pigs may be used in testing the effect of tubercle bacilli, for which it is one of our best guides. Notice is particularly directed to guinea-pig 5, which gained more than 50 grams and was found free from tuberculosis when autopsied, while all the other guinea-pigs that were found to be tuberculous lost weight.

This study convinces us that the bovine type of *Bacterium tuberculosis* was the microorganism which caused the disease that resulted in the death of this pony, rather than either the human or the avian type. This conclusion was arrived at after we had succeeded in eliminating the avian type by direct inoculation of the cockerel, and after noting the growth characteristics of the organism in both guinea-pigs and rabbits, as well as on culture media. The fact that this strain was highly virulent for experimental animals would, according to Cobbett (6), indicate that it was derived directly from the ox.

The duration of the disease in this pony appears to have extended over a period of about nine months. This shows that tuberculosis in the horse is likely to assume the chronic form and develop slowly as it does in other species of farm animals.

The nature and location of the lesions in the pony point to the digestive tract as the portal of entry for the infectious organism. Apparently the large mesenteric lesion was the primary focus from which other organs became infected.

NOTE.—Since the foregoing was written, three more cases of tuberculosis of equines have been reported by Dr. F. Boerner, Jr. (8).

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INTERNATIONAL CONGRESS ON COMPARATIVE PATHOLOGY

The program for the Second International Congress on Comparative Pathology, to be held at Rome beginning September 20, 1922, has been announced by Prof. E. Perroncito, chairman of the executive committee. The subjects to be presented cover a wide range in the pathology of man, animals and plants, as follows:

1. Experimental grafting.
2. Regeneration of the nerves in experimental pathology, nervous diseases and war lesions.
3. Vitality of animal and vegetable parasites.
4. Present state of the cancer problem.
5. Vitamins and deficiency diseases in man and animals.
6. Filterable-virus diseases.
7. Foot-and-mouth disease.
8. Rinderpest.
9. Fowl cholera.
10. Bee plague.
11. Disease of silk-worms.
12. Bacteriophages.
13. Bacterial and plant tumors.
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Other subjects may be added on the proposal of members of the congress before April 1, 1922.

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Other subjects may be added on the proposal of members of the congress before April 1, 1922.

THE PRACTICING VETERINARIAN AND THE ACCREDITED HERD WORK [1]

By J. G. TOWNSEND, *Racine, Wisconsin*

WHEN I was invited to read a paper on this subject before this conference, I felt that one of my few years of experience was hardly the proper person to appear here. It was only because I was assured that the viewpoint of a young practitioner was what was desired that I consented. Current professional literature is full of articles commenting on the small number of men matriculating in the veterinary colleges throughout the country, and it is worthy of thought that the attitude of a man entering into the profession at this time should be considered. It is for that reason only that I feel at all justified in presenting my attitude for consideration.

To a man starting to build up a practice in a great dairy State, the problems of tuberculosis and its control form no insignificant part of the task before him. I have heard quite a few men, recent graduates, who were so impressed with the magnitude of the proposition and responsibility involved that they expressed a desire to avoid this responsibility and do no tuberculin testing at all. Whether or not they have since gained confidence, or whether they still persist in this attitude, I do not know, but at any rate that is the way this proposition looms up.

To a man who has started practice since its inauguration, the accredited-herd plan presents perhaps a somewhat different aspect from what it does to the older practitioner. In the territory in which I practice there were a number of herds under supervision at the time I located there. The owners of the larger purebred herds, and, of course, the smaller ones also, while they were desirous of having their herds clean, were also most anxious to have the work done so that they might have the same advantages. That is, they wanted to be able, in competing with other breeders, to state that they were under Federal-State supervision. This was no more than fair, of course. I have taken the stand that when one of these men spoke to me about testing his herd I was simply doing my duty to him, as my client, to ex-

[1] Presented at the Tuberculosis Conference, Chicago, Ill., November 25 and 26, 1921.

plain to him the advantages he might derive, commercially, by putting his herd under supervision with a view toward having it accredited.

There is, of course, in this proposition the immediate and very tangible fact, especially to the young practitioner, of the loss of the fees involved. I feel that by following this course the practitioner will not be any the loser, unless the increased confidence and respect of these clients is without value.

I believe, however, that an effort should be made by all interested in the educational and extension work for this plan, to be certain that the real benefits are not depreciated by emphasizing the fact that it is free work. It is difficult to talk to the man with a herd of ten or twelve grades and a scrub bull who comes to you and asks that "next time that man that tests So-and-So's herd is down, have him come and test my herd." With the men who want accredited herds and who benefit by them, the question of cost is not an important item. One of my clients, owner of a large herd under Federal-State supervision, stated to me that the increased value of his cattle would more than offset the usual fee for tuberculin testing. This, I think, is the attitude of the great majority of owners of purebred herds. There are, however, those to whom the Federal-State accredited test will never mean anything more than a free test.

It has occurred to me that under present economic conditions some owners whose herds have been accredited may feel as some have felt regarding hog cholera work—that they can afford to run the risk of omitting subsequent tests. I feel that it is due the veterinarian that the Federal-State authorities urge the further cooperation of the breeder. There surely should be provision made so that it will be necessary for a man to make an effort to hold the ground gained if he is to have further cooperation from the Federal-State authorities. I mean, though this situation may not at any time prevail, if a herd is placed on the accredited list and the owner omits to test the ensuing year, his herd, under the ruling, ceases to be accredited. Will it then be possible for him to reapply and have that herd again placed under State and Federal supervision? A letter should be written to the owner of a herd at the time his certificate is issued calling his attention to the fact that he must have a test made by an accredited veterinarian in order to maintain his herd

on the list. Another letter at the eleventh month, reminding him that a test must be made some time during the next thirty days, would be a good follow-up measure.

In regard to the supplementary list, comprising herds which have passed virtually the same requirements as a fully accredited herd, two clean annual tests, but in which a reacting herd bull is kept, I do not suppose that there will be any appreciable number of such herds. However, as these herds are not fully accredited, I presume that such herds would be tested by Federal-State inspectors. Here is a situation in which I feel that the local veterinarian, who virtually has the herd under his constant supervision, might be used to advantage if he can be used anywhere.

Personally, I believe that we are doing more tuberculin testing. I have had tests to make for all but one of the herds in my territory that are under Federal-State supervision. In cases where the Federal forces have aided in area work and large numbers of herds have been placed on the accredited list, I believe that if even only 10 per cent of these herds are returned to the local practitioner it will be more tuberculin testing than was ever available before.

From the Department of Agricultural Bacteriology, University of Wisconsin, I have the following figures relative to the amount of tuberculin sent out to veterinarians:

Year	mils
1917-18	260,000
1918-19	351,000
1919-20	451,000
1920-21	498,000

Occasional requisitions are made on the Federal Department, and some is furnished by biological houses. If this reflects at all the amount of testing done by the veterinarians, it can not be that the work done by the Federal-State inspectors is causing much decrease in the amount of work available for the local practitioner.

The cooperation of the practicing veterinarian is vital to the success of any attack on any infectious disease. At this point, as a practicing veterinarian, I want to thank the gentleman from Virginia, Dr. J. G. Ferneyhough, for the splendid brief he presented for the practicing veterinarian this morning. Under the

present conditions the herd tested under Federal-State supervision has an advantage we can not give—the certificate of health carrying the weight of Federal-State authority. As this is the very feature that most of our clients want, I feel that we must try to procure it for them by the only means at our disposal, cooperation to the extent of our ability with the Federal-State authorities.

I take this opportunity to express my appreciation of the courtesies and cooperation given to me by the Federal and State authorities of the State of Wisconsin.

Dr. W. M. Gordon, an active member of the A. V. M. A., has been appointed City Meat Inspector for the Health Department of Omaha, Nebraska.

Dr. M. J. Kemen, formerly in Bureau service and who resigned May 4, 1920, was reinstated November 16, 1921, and assigned to hog cholera control work in Mississippi.

Dr. E. W. Nye, assigned to hog cholera work in Mississippi, has been transferred to the same class of work in Texas, effective December 1, 1921.

Dr. J. C. Burneson of Cleveland, Ohio, who left the Bureau service October 14, 1920, has been reinstated and assigned to hog cholera work in Kentucky.

Dr. A. H. Julien of Columbus, Ohio, engaged in hog cholera control work in that State for a number of years, has been transferred to the same class of activities in North Carolina.

Dr. and Mrs. Adolph Eichhorn of Pearl River, N. Y., were in attendance at the Cuban Medical Congress, which was held at Havana, in December, 1921. They report a most interesting and successful conference, with much pleasure and entertainment intermingled with an instructive scientific program. On returning the Eichhorns spent a week at the various Florida resorts. Readers of THE JOURNAL may anticipate an interesting review of the congress from Dr. Eichhorn's pen in the near future.

RELATIONS OF THE VETERINARIAN TO HUMANE WORK[1]

By W. G. HOLLINGWORTH
Utica, New York

TO BE A SUCCESS in life should be the height of ambition of everyone. There has been no time in the world's history when opportunities were so great as at this very hour. While this is true, we must admit at the same time that the services demanded from all of us are very much greater today than ever before. Because of this condition mediocre men and women still constitute the very large majority. Look around in your own community, think of all the people you know well; how many are there who are doing anything to make their services more valuable to the institution that employs them, or to live up to the Latin phrase, "Non nobis solum," which means, "Not for ourselves alone but for others"? The great trouble with us is that we are selfish and do not try to cultivate ourselves against selfishness. We were all brought into this beautiful country through no fault or desire of ours. It is the duty of those who are responsible to bring up the rising generation to be physically, morally and mentally right. As unselfishness is one of the blocks that go to make up the arch of success, children must be instructed properly from the start to practice it. Success as an individual affair. It does not come by wishing for it, but we must work for it. We must take the initiative to do the right thing at the right time without being told.

Vocation if rightly selected is another one of the blocks that go to make a success in life. There are two things that happen to a young man at the time of life when he is not as a rule capable of solving such serious problems. One of them is selecting his right vocation; that is, the work he is adapted to; and the other is selecting the right kind of a young lady for his life companion, his wife. A misjudgment of either spells success or failure in his life. In regard to my own profession, and using myself as an example, if I have made any success in my career, it is due to the fact that I selected the veterinary profession for my vocation because I found that I was adapted to it, and that

[1] Presented at the State Convention of Anti-Cruelty Societies, Utica, N. Y., Oct. 4-5, 1921.

I selected a lady for my wife who is kindhearted, sympathetic and naturally loves animals and loves to love and loves to be loved.

Being enthusiastic in my work and clamoring for knowledge, I want to be progressive. If I were to stand still I would be retrograding, and, such being the case, I feel that there are many others in my class. I also feel that there are great opportunities for the right kind of young men to enter veterinary colleges that stand for higher educational qualifications, one whose director or dean will ferret out of the prospective student whether he has the qualifications necessary for a young man to have to make an ideal veterinarian, one who is going to be a success and not a failure. Of the latter class we have now more than we want, maybe not any more than other professions. Our profession needs men who possess the higher ideals of man, faithful husbands, and loving fathers.

We now come to the point of finding ourselves working, thinking and feeling in relation to new environments. After all, the mark of an educated man is his breadth of sympathy and appreciation, and this depends upon his knowledge of the lives of other men. The progress of man lies in his ability to adapt himself to ever-changing and ever-growing environments. In this progress our schools and universities must be leaders. It is their business so to educate young men and women that they will be able to cope with the conditions of affairs, understand them and be able to practice and teach them. This slowly gaining educative work has the approval of the public and consequently will succeed. Education is slower than legislation, but it is sure. Such being the case, we must have the continued support of the church and state, and each must do its part. This is the era of the universal teaching of humane methods. Christian education is the foundation which we must build upon, and it must be so substantial that it will hold up any structure that is built upon it. Humane work is purely educative, and in order to make our commonwealth a better place to live in and make better citizens we must enforce higher education. That being a fact, all money that is set aside and spent for this work is well spent, coming from whatever source it may.

In a moral sense, words can hardly express what effect such efficient work can do in any community. I think it is the duty of all of us to take a yearly inventory of ourselves. Just go into

some quiet corner, sit down and think, and ask ourselves, Have I led a pure life? Have I done my duty to my fellow men? What can I do to better myself? What can I do to help others to lead a more righteous and humane life? By so doing you will prove to your friends as well as those who are not, that you mean to do right, you intend to be right, you are going to be as nearly right as you possibly can; then if you make a mistake through no fault of yours, you ought not to be too severely criticised.

In the words of President Harding, "Humanity never needed a broad, illuminating understanding more than it does now." I can think of no greater service I could render than to impress upon every one the part that awaits him or her in humanity affairs, if he or she will but realize it. I implore a dedication to common service, to humane betterment, to civilization's advancement, on the part of the people, especially the young people, who at last must so largely direct the affairs of this country and society in the future.

If there is to be built up in our country a firm structure of humanity of the people, the children are logically the foundation upon which the structure must rest. Humane education of children is therefore vital, as the child of today is the citizen of tomorrow. It is quite necessary for those who are holding positions of instruction to practice outside of the school room what they preach in it, whether it be a high school or university. By so doing they will instill in the student's mind the necessity of applying their motives and character during their spare time, and their companionship, in putting into force the slogan, "Be kind to animals." To prove that this theory is correct, I purchased 10,000 of these buttons and had them distributed among children, young and old, in different schools in all grades; and I am confident that they stimulated the young people's minds and found fertile soil which might have lain dormant. As a result the parent was finally reached and in many cases enthusiastic humanitarians were developed.

This great and glorious country, possessed of all its resources, capable of feeding besides its own population the starving of Europe, is dependent upon one class of loyal American citizens, whose problems are of the greatest magnitude, the man who holds the prosperity of this nation in his hand, whose day's work is never done and who is ready to respond to the call of

production, the agriculturist; and he is dependent on fertilization to enrich the soil so as to increase production; and fertilization is dependent on livestock, which amounts to the great wealth in this country (including pet animals and poultry) of ten billions of dollars; and the wealth of this great mass of living creatures is dependent upon the veterinarian, who is their guardian. So the agriculturist and the veterinarian must work together, and one can not do without the other. In order to get the results necessary to make this branch of agriculture more productive, the livestock must be cared for in as humane a way as possible. Through neglect and any of the conditions that lead to the same there are annually hundreds of thousands of dollars, yes, millions, lost; and here is where the veterinarian above all men is the one to instruct the tiller of the soil ways and means to prevent this great unnecessary loss. It is purely an educational affair.

We are living today in an era of prevention. Back of this is the public sentiment. That being the case, anti-cruelty societies are ever welcome. Whenever one exists, if a veterinarian is in the locality I believe it is his greatest asset to become closely associated, as his opinion is constantly sought in an advisory way, and he should carry out the motives in action. You will always find oversympathetic members, and very often a balancing power is necessary to instill in their minds that cruelty should be looked on from all sides. They should be broad-minded, to know that it is just as cruel to inflict unnecessary pain on one animal as another. Right here fashions have many followers. You see feathers and furs used by a great many people. Do they ever think back and consider what suffering the animal went through in order that such materials could be procured in order to decorate a human form?

I am glad to be able to call myself a veterinarian for the reason that I know of only one thing that is more lovable than to render services to an animal that is suffering that can not comprehend or show its appreciation for what you do for them, and that is a lovely woman.

The veterinarian of today should practice and teach methods whereby all operations should be performed under local or general anesthetic when and where possible. It has been my privilege to lecture annually to veterinary students for quite a few years on this subject, and I am glad to say that this has

borne fruit. I have tried to have clinics at the association meeting follow out this plan, and I can see that in late years a wonderful difference in that line, for which I am very glad.

The position a veterinarian holds in his community is very far-reaching. One of the things he is seeing continually is cruelty, intentional or otherwise; and here again is where education will do a great amount of good. It is very much better to take up these cases as they come, sit down and educate the person to take into consideration the Golden Rule, "Do unto others as you would have others do unto you," than to go to court with them the first thing you do.

In conclusion, love some one; in God's name love some one; for this is the bread of inner life, without which a part of you will starve and die. Though you feel you must be stern, even hard, in your life of affairs, make yourself at least a little corner somewhere in the great world where you may unbosom and be kind.

Dr. H. S. Ijichi, a graduate of the Chicago Veterinary College, has been spending several months in post graduate work at New York University. After visiting the Bureau laboratories in Washington for ten days, he left for Europe and expects to reach his native land of Japan during the early summer.

Dr. Harry M. Martin, animal pathologist at the University of Nebraska, following the Livestock Sanitary Association meeting in Chicago, left for the East where he will spend the next six weeks visiting the laboratories at Columbus, Philadelphia and Washington, D. C.

Dr. Martin reports the illness of his chief, Dr. L. Van Es, who we trust will make a speedy recovery.

Dr. G. A. Roberts, formerly of West Raleigh, North Carolina, and now of the Veterinary School at Sao Paulo, Brazil, and Miss Ora M. Glenn of Lavras, Minas, Brazil, were married on December 1, 1921. They will make their future home at Rua Fagundes, 5a S. Paulo, Brazil.

Dr. Roberts' many friends in the United States will enjoy sending their best wishes to Dr. and Mrs. Roberts.

LIVESTOCK SHIPPING LOSSES AND SOME METHODS FOR PREVENTING THEM [1]

By W. J. EMBREE
Chicago, Ill.

SOME of you, perhaps, are not acquainted with the work of the Western Weighing and Inspection Bureau, and for the benefit of those that are not, I will state that this bureau was organized many years ago for the purpose of checking weights for Western railroads. After its organization many inspection features were added. The veterinary inspection was started in the fall of 1917, at the markets of Chicago, Kansas City, St. Louis and Omaha. From this beginning the work was extended to St. Paul, Sioux City, St. Joseph, Oklahoma City, Wichita, Denver and Fort Worth, they being the 11 principal markets at which we are now operating and which I will hereafter mention. We are also doing some work at Houston and San Antonio, Texas, and at Little Rock, Ark. The purpose of our work is to discover the cause of death of livestock in transit and issue our findings to railroads and shippers, so that future loss may be prevented.

The subject matter of the message which is conveyed in the accompanying pictures refers principally to hogs, as they are our most troublesome animal in transit; and as we are so often called upon to explain these and similar things to laymen, it is couched in untechnical language. We, as veterinarians, by our association with shippers and producers of livestock, can do much to prevent loss in transit, and my message is principally for the purpose of calling your attention to a few things that you can pass along to places where they will do the most good. The subject of livestock loss in transit and its prevention is a large one, with many angles, but we have adopted the plan of concentrating on hogs, and you will plainly see why we adopted this plan. In our pictures and demonstrations we have used the month of June quite extensively for the reason that we find it to be an average month, and by using it we avoid extremely large figures.

In the month of June, 1920, the loss on grown cattle was one

[1] Presented at the fifty-eighth annual meeting of the American Veterinary Medical Association, Denver, Colo., September 5-9, 1921. Illustrated with numerous lantern slides.

dead animal to every 2,600 received. When calves are included with the cattle, the loss is 1 dead to every 1,100 received; sheep, 1 dead to 1,600 received; and hogs, 1 dead to every 300 received, which is approximately 1 dead hog to every three cars. This shows that the loss in hogs is more extensive than the loss in any other species of food animals, and for that reason we concentrate our work on the prevention of loss in hogs.

Since we have noted how much greater the loss is in hogs than in other animals, we will analyze the comparative cause of death of hogs and cattle. The cause of death in cattle is quite evenly distributed among several different diseases, and injury is the second largest one cause. Causes of death in hogs are not evenly divided. We have one great cause which is killing practically 65 per cent of the hogs; that is, acute diseases located in the lungs.

If we observe the construction of a fat hog—the heavy fat body and the short legs—it is easy to understand why hogs are especially susceptible to diseases located in the lungs. It would be impossible for an animal so constructed to move very freely on his feet. The length of the step is probably limited to 10 or 12 inches, and in moving 100 feet it would be subjected to probably ten times the exertion that a horse would be in moving the same distance. Hogs in their home pens are not required to exert themselves; their wants are supplied close at hand, and they are not required to move about much in order to keep their body needs supplied. In this way they grow fat and plethoric, their muscular system becomes impregnated with fat, and their heart and lungs do not develop. In fact, the digestive organs are developed at the expense of the organs of respiration and circulation. The lack of exercise causes the lungs to develop only sufficiently to meet the requirements of the condition under which the animal lives.

The function of the lungs is to purify the blood of the body, and in the hog perspiration (sweating) being almost impossible, a large part of the excess moisture and heat of the body is passed off through the lungs; therefore a hog with undeveloped lungs will suffer more quickly in hot weather than one in which that organ is well developed.

I believe it perfectly safe to say that hogs that are fattened quickly do not develop more than 80 per cent of the lung space which they normally should have. In other words, their heart

and lungs are developed sufficiently to keep them alive while at home, but are not in condition to keep them alive when they are subjected to the unusual exertion of being loaded and transported to market; and it is this hog with the poorly developed heart and lungs that comprises 90 per cent of our in-transit losses. The strain on these vital organs starts the minute the hog is removed from its home pen. It is first subjected to the trip to the loading point, which may be made in the most careful manner; but it is impossible to subject this hog to this trip without causing it to take more exercise than it has taken at any one time since it was a small pig. This exertion causes the heart to increase in action and the blood vessels of the lungs dilate and become overcrowded with blood. The hog pants and becomes short of breath, and if it is not immediately placed in a cool, quiet place where it can return to normal it will die of acute congestion of the lungs or other acute lung disease.

When an animal that is unaccustomed to exertion is forced to exert himself in hot weather the forced inspiration of warm air causes the capillaries of the lungs to dilate. The dilation of the capillaries restricts the air space, and as the condition advances the tissues of the lungs will become engorged with blood and the air vesicle itself may become filled with serum and blood, and as the condition advances the hog will suffocate for the reason that he can not purify the blood of the body.

Hogs are sometimes driven to the loading point on foot. This is a very bad practice. It is surprising in the investigation of losses in transit how many cases we find where the loss has occurred when hogs were driven on foot to the original loading point.

A good method of transporting hogs to the shipping point is to haul them in a wagon or truck. They are often exposed to great exertion, however, at the time they are rounded up for loading into the wagon or truck, and hogs can suffer greatly while being hauled in a wagon on a hot day if they are not shaded or wet down.

Great care must be taken that the hogs are not rushed in loading, and this can be avoided by the shipper giving himself plenty of time. A man who is crowded for time is likely to abuse and beat the animals in order to rush them into the pen to prepare them for loading into the car.

There are many factors that enter into the cause of death of hogs in transit. In hot weather manure and filth on the floor of the car may become heated, causing the hogs to become restless and nervous so that they will not cool out after they are placed in the car. Sand is the best bedding for the transportation of all livestock, especially in hot weather. Dirty, filthy cars do not seem to be as harmful for the transportation of cattle as they are for hogs unless the condition is very bad, but in all cases a clean, sanded floor gives the animals the best chance to arrive at market in good condition.

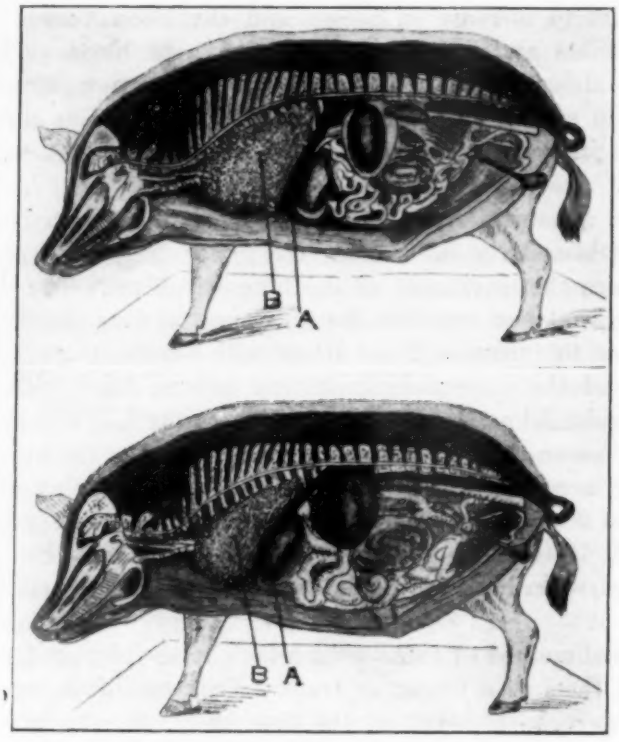


Fig. 1.—Upper figure shows relation of diaphragm (A) to lungs (B) when stomach and bowels are not full. Lower figure shows relation of diaphragm (A) to lungs (B) when stomach and bowels are full of food and distended with gas.

We now come to the matter of properly feeding animals before they are shipped to market. The drawing at the top of figure 1 represents the position of the digestive organs and lungs in a hog that is not full. The picture at the bottom shows the position of these organs when animals have been excessively

filled and the bowels are distended with gas. It can be seen that the lungs in the bottom figure do not have the room for expansion that they have at the top. When the matter of overfeeding is coupled with other conditions, such as driving and loading in dirty cars, the loss may be extensive.

In investigating a loss of 30 dead hogs removed from one car it was discovered that the hogs had been fed on pasture up to within two days of the time of shipment. At that time they were placed in a small pen and fed all they would eat. In addition to this 15 bushels of corn was placed in the car at the time of shipment. Four other shipments moving from the same station on the same day were not handled in this way. They arrived at market with no loss.

Overloading cars is another great cause of loss in summer as well as in winter. Statistics show there is only 50 per cent of the loss in lightly loaded cars that there is in those that are heavily loaded.

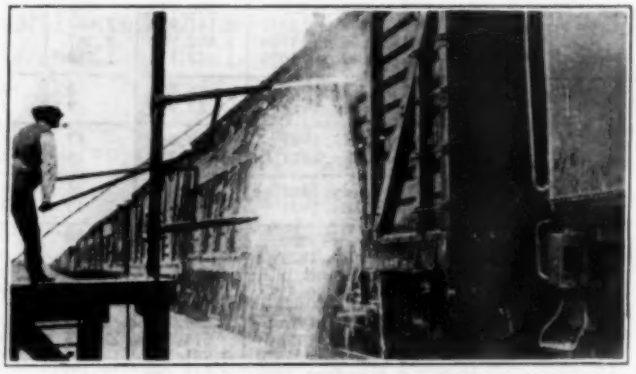


Fig. 2.—Apparatus used for sprinkling hogs in railroad cars in hot weather to prevent losses

The sprinkling or watering of hogs in transit is an important means of preventing losses in hot weather.

The shipper should wet the car thoroughly before the hogs are placed in it. A sprinkling apparatus that is in use by many of the railroads is shown in operation in figure 2. The advantage of this apparatus is that the water may be turned on and the train moved by a slow rate of speed, thus sprinkling hogs thoroughly without necessitating delay.

For many years some shippers have iced their hogs in transit in hot weather. About two years ago we came to the conclusion

that this was an excellent practice and since that time have issued many circulars in order to give information in regard to this subject. What we consider the best method of icing hogs in hot weather is to hang six ice bags in the roof of the car, with 50 or 75 pounds of ice in each bag. The ice will cool the car and the drip will keep the floor damp. We have found on actual experiments that 50 or 75 pounds of ice suspended in the car will remain effective for 20 or 30 hours. In July, 1921, 375 cars were reported iced, and only 19 dead hogs were removed from them, making a ratio of one dead hog to every 19 cars.

Table 1 shows the statistical results of the propaganda and circulars.

TABLE 1.—LOSSES OF LIVESTOCK IN SHIPMENTS RECEIVED AT PRINCIPAL MARKETS

Market	Species	Period	Number Received	Number Dead	Ratio
South Omaha	Hogs	June, 1919	302,617	600	1-500
		June, 1920	281,549	570	1-500
		June, 1921	286,549	336	1-853
		Jan.-June, 1919	2,147,925	3,460	1-600
		Jan.-June, 1920	1,802,988	2,797	1-600
		Jan.-June, 1921	1,662,174	1,718	1-967
Denver	Cattle and calves	July, 1920	26,654	2	1-13,327
		July, 1921	32,029	9	1-3,558
	Hogs	July, 1920	18,886	17	1-1,116
		July, 1921	24,785	16	1-1,549
	Sheep	July, 1920	70,803	26	1-2,728
		July, 1921	68,200	15	1-4,546
Chicago	Cattle and calves	June, 1920	297,468	539	1-552
		June, 1921	299,001	468	1-639
		Jan.-June, 1920	1,780,781	3,283	1-556
		Jan.-June 1921	1,747,536	2,581	1-667
	Hogs	June, 1920	669,320	3,534	1-189
		June, 1921	674,945	1,713	1-394
		Jan.-June, 1920	3,921,556	13,206	1-297
		Jan.-June, 1921	4,143,399	10,425	1-397
		July, 1919	603,442	1,817	1-332
		July, 1920	584,220	1,067	1-547
		July, 1921	567,672	1,008	1-563
St. Louis	Cattle and calves	June, 1920	113,915	108	1-1,054
		June, 1921	86,580	92	1-941
		Jan.-June, 1921	508,793	1,086	1-468
		Jan.-June, 1921	421,251	489	1-861
	Hogs	June, 1920	241,696	582	1-409
		June, 1920	275,494	493	1-651
		Jan.-June, 1920	1,912,266	3,653	1-523
		Jan.-June, 1921	1,805,758	2,941	1-614
St. Paul	Cattle and calves	June, 1920	88,928	130	1-684
		June. 1921	70,482	112	1-629
		Jan.-June, 1920	546,303	1,077	1-507
		Jan.-June, 1921	425,713	626	1-680
	Hogs	June, 1920	203,890	1,086	1-187
		June. 1921	158,507	537	1-295
		Jan.-June. 1920	1,308,476	4,446	1-294
		Jan.-June, 1921	1,198,864	3,229	1-371

TABLE 1.—LOSSES OF LIVESTOCK IN SHIPMENTS RECEIVED AT PRINCIPAL MARKETS—CONTINUED

Market	Species	Period	Number Received	Number Dead	Ratio
Kansas City	Cattle and calves	June, 1920	177,344	106	1–1,692
		June, 1921	153,578	58	1–2,648
		Jan.–June, 1920	93,658	686	1–1,364
		Jan.–June, 1921	124,159	388	1–2,382
	Hogs	June, 1920	205,919	468	1–439
		June, 1921	226,313	570	1–397
		Jan.–June, 1920	1,491,812	2,796	1–534
		Jan.–June, 1921	1,331,743	3,028	1–436
St. Joseph	Cattle and calves	June, 1920	52,472	13	1–4,036
		June, 1921	41,017	12	1–3,481
		Jan.–June, 1920	327,627	174	1–1,883
		Jan.–June, 1921	261,993	90	1–2,911
	Hogs	June, 1920	182,748	350	1–522
		June, 1921	188,270	268	1–702
		Jan.–June, 1920	1,177,817	1,699	1–694
		Jan.–June, 1921	911,629	1,191	1–789

The loss of hogs at South Omaha was considerably less in 1921 than in 1920. The same is true of Denver. The loss of cattle at Denver was greater in 1921 than in 1920, but it was a very small loss in both years. Chicago shows improvement in both cattle and hogs. St. Louis shows improvement in hogs in 1921 over 1920. There were more cattle lost there in June, 1921, than in June, 1920, but the six months' period shows an improvement in 1921 over 1920. St. Paul shows improvement in hogs, while the results for cattle are practically the same as at St. Louis. Kansas City shows improvement in cattle in 1921 over 1920, but the hog loss was greater in 1921 than in 1920. St. Joseph shows improvement straight through.

Table 2 shows improvement in the matter of hog loss at the eleven principal western markets. The death rate was 41 per cent less in 1921 than in 1920. Table 3 shows the ratio of loss in three species of food animals at these markets.

Some shipments of hogs are made by motor trucks. During July, 1921, at South Omaha 20,860 head of hogs were received in this manner. During June, 1921, 23,676 head were received

TABLE 2.—DECREASE IN LOSS OF HOGS AT ELEVEN PRINCIPAL WESTERN MARKETS

Items	June, 1920	June, 1921
Receipts	2,188,012	2,139,155
Dead	7,157	4,279
Ratio	1–304	1–499

TABLE 8.—RATIO OF LOSS IN THREE SPECIES OF FOOD ANIMALS AT ELEVEN PRINCIPAL WESTERN MARKETS

Species	Ratio, Dead to Received	
	June, 1920	June, 1921
Cattle	1 to 2,600	1 to 2,847
Cattle and calves	1 to 1,100	1 to 1,175
Sheep	1 to 1,600	1 to 1,949
Hogs	1 to 300	1 to 500

there in this manner. We have nothing to do with these shipments and keep no record over an extended period of time. During eleven days for which a record was kept the ratio of dead in truck shipments was one dead to every 614, compared to 1 to 853 in railroad shipments for practically the same period, showing that hogs will die in transportation when they never see a stock car. This has also been verified by investigation at other markets.

We now come to a subject which is rather bothersome to the railroads, and that is the matter of "overs" and "shorts" at markets. There is often a possibility of hogs becoming mixed when being unloaded from railroad cars. Sometimes the chute gate does not close tight against the side of the car, leaving a space of 16 to 24 inches through which small animals may escape. We strongly recommend to stockyard companies that they place an auxiliary slide gate in the chute that may be closed up tight against the side of the car. This need not be done at once, but in repairing the old gates as they wear out this slide could be put in.

The interlocking toe-board is very valuable and necessary apparatus, especially for the handling of horses and mules.

The greatest cause of loss in cattle shipments is thin condition of flesh. A much larger per cent of thin cattle die in transit than any others. Some cattle of this class are shown in figure 3. These cattle were a Texas shipment in the fall of 1917.

An explanation of the digestive apparatus of the ox will show why cattle shrink so greatly in transit. Two-thirds of the abdominal cavity is taken up with the first stomach, called the rumen or paunch. It is possible for this organ in a 1,000-pound animal to contain 180 to 265 pounds of undigested food. When the animal is kept in transit for some time this food will be digested and evacuated, and of course the amount that is di-

gested from this paunch decreases the animal's gross weight to that extent without the body tissues being drawn upon to sustain life. It follows that shrinkage in transit does not involve meat loss unless the animals are kept off of feed for many hours. Meat is what is being produced.

Cuts and bruises are other causes of loss of meat. Cattle are sometimes bruised and cut by the horns of other animals in the same car. Hogs are bruised by the use of whips, quirts and clubs in driving them. Great effort is being made to have all such implements of torture discarded by livestock handlers at our large market centers. The prod pole with a steel point surely belongs to the dark ages and should be discarded by all means, as every prick from a prod pole means a loss of meat, for the reason that injured portions must be removed and very often cuts of meat are spoiled thereby.

Fig. 3—Thin cattle, a class among which losses in shipment are heavy.

The modern method of driving hogs is by the use of the slap-jack. Hogs that are handled in that way come from the scraping and cleaning in the packing house in good condition and there is no loss or spoiled cuts of meat on account of bruises or injuries.

Mr. R. L. Carter, of Swift & Company, has compiled the following statistical information in regard to loss from bruised meat:

Beef Loss on Account of Bruises, Week Ending March 20, 1920

Cattle killed, 25 markets	46,789
Cattle bruised (26 per cent)	12,059
Meat removed on account of bruises	15,933 pounds

Hog Loss on Account of Bruises During the Year 1919

Hogs killed, 53 markets	30,512,000
Estimated loss of meat per hog	One-half pound
Total loss of meat, 53 markets	15,256,000 pounds
Average live weight, Chicago	190 pounds
Average live cost, Chicago	$17.85
Average dressed cost, Chicago	$23.00
Total loss on account of bruises	$3,508,880.00

Loss of meat equal to 80,295 hogs, or about 820 cars.

Hog Loss on Account of Bruises, Week Ending March 30, 1920

Hogs killed, 37 markets	229,606
Total loss of meat per hog	One-half pound
Total loss of meat, 37 markets	114,803 pounds
Average live weight, Chicago	238 pounds
Average live cost, Chicago	$15
Average dressed cost, Chicago	$20
Total loss on account of bruises	$23,860

Loss of meat equal to 501 hogs, or about 5 cars.

COOPERATION BETWEEN VETERINARY AND HUMAN MEDICINE

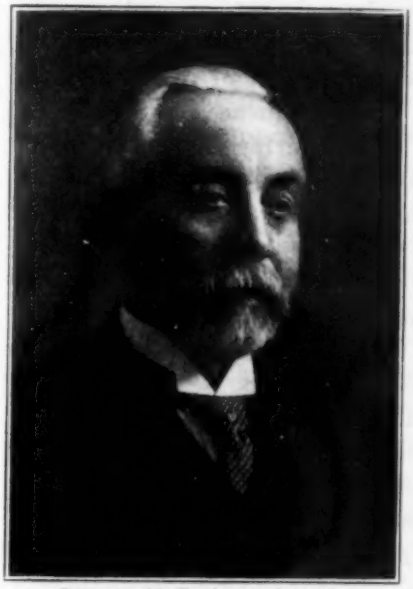
The London correspondent of the *Journal of the American Medical Association* writes as follows:

"The value of cooperation between veterinary and human medicine has often been pointed out, and has recently been insisted on by Sir Clifford Allbutt, but has never been carried out. Mr. Scott, president of the Mid-West and South Wales Veterinary Medical Association, has drawn up the following proposals: (1) A veterinary officer should be attached to the medical department of the ministry of health. (2) A whole-time veterinary officer should be appointed in all large cities to work in conjunction with, but not subordiate to, the health officer. (3) In provincial towns a part-time veterinary officer should be appointed to work with the health officer on the same basis. (4) Research work in comparative medicine and pathology should be carried out in research institutes and universities open to researchers following human or comparative medicine. (5) The older universities should found chairs of comparative pathology. (6) The universities should grant degrees in veterinary science, and postgraduate courses should be arranged. (7) A list of diseases communicable from animals to man should be fully drawn up by physicians and veterinarians, and a closer study of these instituted, particularly prophylactic. (8) The medical and veterinary societies should hold joint meetings to exchange views on matters of mutual scientific import."

DUNCAN McEACHRAN AND THE McGILL FACULTY OF COMPARATIVE MEDICINE [1]

By VERANUS ALVA MOORE
Dean, New York State Veterinary College at Cornell University, Ithaca, New York

IT IS IMPORTANT, among the exercises commemorating the achievements of a hundred years in a great university, that the influence exerted by one of its faculties, that no longer functions as a part of the institution, should not be forgotten. It often happens that a worthy undertaking is brought to an untimely end for want of vision or lack of support. Such was the case with the McGill faculty of comparative medicine and veterinary science. It was organized in advance of the time when the people recognized the economic and sanitary significance of animal diseases, and also before there was much definite knowledge concerning them. Under such circumstances, in an undeveloped country as this was at that time, it is not surprising that the true purpose of veterinary education was neither appreciated nor understood.



Duncan McEachran, LL. D., F. R. C. V. S.

Dr. McEachran opened the Montreal Veterinary College in 1866 and directed its activities so long as his individual efforts and resources sufficed. When conditions changed educationally and adequate support failed, he had the courage to close its doors. A kind Providence has allotted him fourscore years in which to witness the fulfillment of his early prophesies and the

[1] An address given at a complimentary dinner to Dr. Duncan McEachran at the Ritz-Carleton Hotel, Montreal, Canada, October 18, 1921.

adoption of many of his ideas concerning veterinary education. It is a gracious act, at this centennial of the university to which he has been so loyal, for his former students to pay him this tribute in appreciation of his many and valuable services to them and for their cause. There could be no compliment more expressive of the high esteem with which he is held than this gathering of distinguished men from many States and Provinces. Likewise there could be no testimonial more acceptable to him than to be assured in this manner that his labors were appreciated and that his graduates have played a worthy part in the development of the veterinary profession on the American continent.

My duty, as I see it, is not to dwell on the personal achievements of Dr. McEachran, nor to picture the trials and discouragements that he met and overcame, nor to detail the attainments of his former students. All these are matters of record that the future historian will arrange in proper sequence for the coming generations. The task I should like to perform is to bring into bold relief the foundation ideas inaugurated by him and the results of the influence of his work, and that of the graduates of the institution he founded, on veterinary education of today; yea, of tomorrow as well.

In order to appreciate the value of McEachran's services to his profession and to understand why the school he founded exerted the lasting influence for good that it has, we must consider them in connection with the time and the environment in which they operated. Every cause that has succeeded in making the world better for human existence has had a long and trying struggle before the benefits sought have been attained. Likewise, the conception of veterinary medicine and the evolution of a profession to apply the principles of science for the relief of dumb creation and profit to animal industry has had a history that must be reckoned with in understanding the part taken by any man or institution that has contributed to its success.

In the development of veterinary medicine the same forces have operated that determined the growth of human medicine. The theories of the early writers to explain the nature of disease gradually became differentiated into a variety of doctrines, each having its advocates. In turn, these stimulated other thinkers to bring forth still more explanations. Individualism domi-

nated all there was in medicine. The success and subsequent failure of this system is illustrated in the work of Apsyrtus of Bithynia, the veterinarian of the Roman Army, who, in the third century, controlled glanders, recognized the sanitary significance of isolation and mechanical support in the treatment of fractures. As the reason for his successes was not explained, the advances he inaugurated disappeared with his death. A succession of distinguished leaders in the art of healing, each introducing new subject matter with a different explanation as to the cause of disease, tended to confuse and ultimately led to the founding, in the ninth century, of the University at Salerno, which was not only the first university but also the first medical school. Its purpose was to ascertain the truth in the theories set forth by individuals, to correlate all the facts into working hypotheses for their application and to provide methods for teaching the new subjects that were being introduced.

It is interesting to observe that nearly a thousand years later radical changes were called for in the educational system of our country to meet the requirements for its development. This found expression in the law establishing the Land Grant Colleges in the United States. A comparison of the arguments in favor of this law used by Senator Morrill with the reasons advanced for organizing the first university will show a most striking similarity between them. The purpose of each was to find a means by which the truths and principles in the existing knowledge could be determined and made available for the benefit of the people. It is from the Land Grant Colleges that most of the permanent veterinary schools in the United States have arisen. The others are associated, as in Canada, with large universities.

The achievements of the veterinarians in the earlier centuries availed but little in the revival of veterinary science after the Dark Ages. Even the prestige of the earlier schools seemed to have been lost and it was found necessary to begin again. There was the same need that there was in human medicine for trained men to care for the sick and injured. The situation appealed to one Claude Bourlegat, who organized, in 1761, the Veterinary College in Lyons, France. Then followed, in rapid succession, the establishment of numerous schools in many countries for the purpose of conserving the animals that were

being injured in war and lost from disease. While some progress was made in the improvement of methods for the application of existing knowledge, modern medicine, human and comparative, actually began with the work of Davaine, Virchow, Pasteur, Lister and a host of others working simultaneously and following them in the field of natural sciences. These men exposed the fallacies of the former conceptions and traditions of disease and established in their place the fundamental principle that diseases are the natural consequences of natural causes and that prevention is infinitely more important than treatment. This conception, which had been foretold with the conviction of revelation by many earlier workers, had its birth in the experimental method of study introduced by Pasteur and his coworkers.

The period of transition from the empiricism of the ancients to the acceptance of the idea that diseases should be studied and treated as objects of natural history was destined to be one of bitter controversy. It lasted for nearly a generation, and for all time it will require earnest, intelligent endeavor to maintain belief in the modern conception of the nature of disease and the new function it brought to the medical professions.

It was during the time that the specific nature of infectious diseases was being demonstrated, and the natural causes for the others were being determined, that veterinary education began on the American Continent. Prior to this a few unsuccessful efforts to establish veterinary colleges in the United States had been made. Practice was restricted to a few graduates from European schools and a much larger number of men of no preparation or technical training who believed they could in some way drive disease away. The rapid growth of animal industry, the increase in losses from disease due to the long occupancy of the soil, and the introduction of plagues through the indiscriminate importation of animals were signals not to be mistaken for a more efficient veterinary service.

At this time, when the tenets of the profession were being shaken to their very foundation, when old theories were being abandoned and a new knowledge was springing up, five young, ambitious veterinarians, trained in the best schools of Europe, came to America and undertook, each in his own way, to develop veterinary education in the land of his adoption.

They were Alexander Liautard, who came from France to practice in New York City in 1859, but soon assumed the responsibilities of conducting the New York College of Veterinary Surgeons; Andrew Smith, who came from Scotland to Toronto in 1861 and started the Ontario Veterinary College; Duncan McEachran, also from Scotland, who came to Woodstock, Ontario, in 1862, to practice his profession; James Law, a graduate of the Edinburgh Veterinary College, who was chosen professor of veterinary medicine and surgery in Cornell University in 1868; and Henry J. Detmers, who came to America from Germany the same year and entered educational work, first at the University of Illinois and later at the Ohio State University. These men, their students and the graduates of the institutions they founded, have determined the veterinary policies in our two countries.

It would be interesting and helpful to portray the success of each of these truly great men in carrying out his ideas relative to veterinary education and service. They and their students established not only the veterinary schools but also Federal and State organizations for protecting livestock from diseases that arise from within and scourges that otherwise would come from without. The progress they made was won by battling against ignorance, the objections to new theories for the prevention, control and treatment of animal diseases and the vigorous opposition to higher educational requirements for veterinary students. The outcome of the generation in which they lived has been to give these countries veterinary colleges with preliminary educational requirements and length of course that compare favorably with those of human medicine.

The growth of veterinary medicine in Canada and the United States has been so rapid, and those interested in it have become so numerous, that the work of these five great leaders will soon be overlooked by veterinary students because of the enormous volume of new subject matter which science is revealing and which is being organized to aid in making an efficient, working profession. It seems proper that we should reflect on the wonderful inheritance they left us in perseverance, scholarship and character. Fortunately, all of these men were blessed with good health and long life. However, of the five, "the reel of four has been wound" and the shuttles lie empty, but for the

fifth, our guest of honor, there are remaining other, and we hope many, threads to be added to the woof of his already long and useful life. His strenuous efforts for the benefit of his profession, especially in raising its standards educationally, are likely to be underestimated by those who pass judgment on the influence of a college that did work of a pioneer nature and which thrived for a time and then disappeared. In this connection it is well to remember the principle, underlying all great achievements, that "progress is made sometimes by retreats as well as by advances." He is a wise general who knows when to halt his troops in order that that which has been gained may not be lost.

In 1866 Dr. McEachran severed his relations at Woodstock and came to Montreal. At the suggestion of Sir William Dawson, Principal of the McGill University, Dr. George Campbell, Dean of the Medical Faculty, and Major Campbell, President of the Board of Agriculture of Lower Canada, he inaugurated a course of lectures in connection with the Medical Faculty of the University. The veterinary students were admitted with the medical students to all classes embraced in the veterinary curriculum. McEachran was appointed director and lecturer on veterinary medicine and surgery. From the inception of the school he set himself to the task of raising the educational standards of his profession. He was the life and soul of the school until he had taught those who became co-workers in this labor of love. At this time, when the British and American veterinary schools required no matriculation tests, McEachran inaugurated an entrance examination and insisted on a course of three sessions of six months each instead of two that were required in other veterinary schools. In human medicine two years only were required. Several distinguished men in the medical faculty cooperated in this work. Crask in chemistry, Fraser in physiology and pathology and Dawson in botany were among those who, in the early days, taught and inspired veterinary students. Thus began the third veterinary college on the continent and the second in Canada.

It was only those possessed of a prophetic vision who could understand the necessity for the exacting specifications of McEachran in organizing this new veterinary school. He understood then—as we all do now—that preliminary educational

training is essential on the part of the students to enable them to understand the more difficult technical subjects in a professional course. Again, he recognized that three years was a minimum time in which students could be disciplined in the subjects of the curriculum. It was this call to higher ideals in the profession, which foretold more efficient service, that appealed to the manhood and the intelligence of many young men who, I believe, would not have studied veterinary medicine without it. Measured by present criteria, the requirements demanded were small; but judged by the standards of fifty-five years ago, they were outstanding and conspicuous for the long step they took in advance. The prerequisites advocated and won by Law and Detmers many years later were no more progressive, because of the general educational attainments of the time, than were those insisted upon by McEachran in 1866.

At first the Montreal Veterinary College occupied rooms with the McGill Medical Faculty. Later McEachran, at his own expense, built the college on Union Avenue. In 1889, on the recommendation of the Faculty of Medicine, the Governors of McGill University created a Faculty of Comparative Medicine and Veterinary Science, and appointed him Dean and Professor of Veterinary Medicine and Surgery.

Although the Montreal Veterinary College, and later the Faculty of Comparative Medicine and Veterinary Science, was affiliated with McGill University, it did not receive financial support from that source. The Government finally gave the college a grant of $1,800 annually, but beyond that it was supported by the fees of the students and the generosity of its Dean. The University, however, continued to give instruction to the veterinary students in such subjects as their curriculum called for that were being taught by the Medical Faculty. It was the inspiration engendered by such men as Osler, Adami, Mills and Wyatt Johnson, as well as by those who preceded them, that extended the reputation of the school. Men came to it not only from Canada, but from beyond her boundaries. They came to it, or went from it, to 26 States and Territories in the Union, as well as to Africa, Australia, Cuba, England, Hawaii, Ireland and the Philippine Islands. Of the approximately 312 graduates, 148 came from or went to the United States.

The high reputation of the McGill Veterinary College in

the United States was established through the excellent work of her graduates. They were leaders, whether among practitioners, those doing State livestock sanitary work, or teaching. In almost every group of men interested in these subjects, we find a McGill man. Such men as Pierce, Hinckley, the Miller brothers, Mulvey, McCracken and many others, imparted to their respective communities not only a conception of service but also one of dignity in the practice of veterinary medicine. These men have been very influential in stimulating educated young men to enter the profession. Lamb in Colorado carries the authority and influence he does because of his excellent work in State veterinary service. Higgins was a leader in laboratory work, and Blair is giving the world a great wealth of new knowledge on the intelligence of wild animals and their care in captivity. Ramsay is doing a work in the eradication of disease that will make him famous for all time. Among the teachers and research workers in veterinary medicine in the United States, Williams stands in the front rank. His results in the development of important surgical operations, especially the one for roaring, known by his name, has given him an international reputation as a surgeon. He was among the first in the study of the diseases of breeding cattle. His findings have done much to point the way to a successful method for the treatment and prevention of abortion and sterility in cattle. His treatise on this subject, which is just off the press, will be welcomed by the profession. Further, he is the author of the best text-book on veterinary obstetrics and also of the first series of exercises for laboratory instruction in practical veterinary surgery. I know of no teacher in this or other fields of veterinary science who has done more to simulate research and to bring the profession into its own than this distinguished alumnus of your Alma Mater. In Canada many responsible veterinary positions have been filled by McGill men.

The creation of the sciences, always a slow process, had reached a period of intensification. The last fifty years had been "the most prodigious period of change through which the world has ever passed." More progress had been made during this time than in the previous hundred centuries to solve the problem of human control of nature's forces. It was not strange, therefore, that the Dean, recognizing the advances that had

been made in the physical and biological sciences and the necessity for well-equipped laboratories and better facilities for teaching clinical medicine and for research, decided that if these could not be provided it would be better for the school to discontinue. He had a fitting realization of his duty to the students, to the alumni, to the profession generally and to the livestock industry of his country. He had spent lavishly of his personal funds, but with the rapid progress of the profession they were insufficient, and, failing in his efforts to obtain financial support for his faculty, he tendered his resignation in 1903 and the school was closed. The Board of Governors of McGill University appointed him professor emeritus and in 1909 honored him with the degree of Doctor of Laws.

Dr. McEachran is to be congratulated for his act which led to the closing of the school, much as at the time it embarrassed him, the University and the alumni. He believed the school should continue along the lines he had formulated to provide an adequate veterinary service to safeguard the animal husbandry of his country. He feared disaster to the industry if properly trained veterinarians were not available. It is a compliment to him that he saved the good name of the institution. With the inevitable development of the livestock industry of Canada, it is not unlikely that the University may be able to restore its Faculty of Comparative Medicine and to continue the important work so nobly started in 1866.

McEachran's interests in his profession were not limited to the school he founded. He assisted many undertakings where his technical knowledge was needed. He early became associated with the Government in connection with livestock sanitary work, in which he was most successful. It is difficult for us to appreciate the trials that beset those seeking the enactment of the first laws giving authority for the organization of livestock sanitary work. The people were living in a vast and beautiful country, abounding in animals and free from the plagues that staggered the Old World. The expanse of ocean between the old and the new countries seemed to give protection against the scourges abroad. However, McEachran saw that the increasing importation of purebred animals for breeding purposes would introduce, sooner or later, serious maladies if the country was not protected against them. In a letter to

the Minister of Agriculture, under date of September 28, 1875, published in *The Farming World,* he called attention to the fact that cattle plague, contagious pleuro-pneumonia, foot-and-mouth disease and sheep pox had been introduced into Great Britain by importing stock from infected districts on the Continent of Europe, and emphasized the necessity of protecting Canada against such invasions. The result of his efforts was the establishment at Fort Levis of a station for detention, with the consent of the owners, of imported animals. The value of this measure was recognized promptly and other stations were provided. In 1876 he organized "The Cattle Quarantine System of Canada" and for twenty-seven years was its executive head. It has been reported that it was the most successful and complete organization of its kind.

In 1879 he was sent by the Canadian Government to the United States to investigate the pleuro-pneumonia situation. His report led to important action by the Canadian Government to prevent the importation of that disease. The immunity Canada enjoyed from that scourge was due to regulations formulated on his recommendations. The arguments he advanced for a thorough quarantine are set forth very clearly in an article which he read at the thirteenth annual meeting of the United States Veterinary Medical Association and published in the first number of the *American Veterinary Review* (1877). I quote from the concluding paragraph. It may do us good to read what he wrote 45 years ago.

"In conclusion, gentlemen, I would suggest to this Association, that you should approach the Government and point out the necessity for preventative measures being adopted and urge upon them the importance of recognizing this profession, and ceasing to appoint uneducated men to positions of responsibility, while you have young men educated in science, both able and willing to fill the positions. Let our motto ever continue to be 'Vis Unita Fortior,' and instead of our noble science * * * being looked upon as scarcely respectable, we must and will stand side by side with all the other liberal professions. And I certainly do think that if we can bring about the objects of this paper we will do much to deserve the lasting thanks of this great people."

In the same volume there is a series of articles on veterinary education and its significance in the prosperity of our animal

industry, that both veterinary officials and teachers can still read with profit.

The influence of McEachran's work in Canada did much to aid Salmon in organizing the Bureau of Animal Industry in the United States Department of Agriculture in 1884 and in formulating regulations for the mutual protection of Canada and the United States in the interchange of livestock. It was through the efforts of these men that we have been safeguarded against the infectious diseases that are reported to have cost England alone more than $400,000,000 during the first quarter of the nineteenth century.

In 1896 McEachran accompanied the Minister of Agriculture to Washington and assisted in arranging an agreement by which the quarantine between the two countries was virtually abolished. This opened the markets for mutual advantage to the livestock trade between the two countries. In 1897 he visited for the Canadian Government many of the European countries to study the situation in each relative to the existence and methods for the control of communicable livestock maladies. His report on this inquiry is worthy of careful study. In 1899 he represented Canada at the Seventh International Congress for the discussion of international livestock trade.

McEachran did much to enlighten the people on the prevention and control of animal diseases as well as to enforce preventive measures. He issued from time to time bulletins on the diagnosis and prevention of tuberculosis, sheep scab, glanders and other communicable diseases of sanitary and economic importance. He was interested in meat inspection and was among the first to recognize "deficiency" disease among animals. He was an unquestioned leader in livestock sanitation.

I am not unmindful of the criticisms that have been made on the shortcomings of the quarantine and other protective measures that were instituted in those early days. Undoubtedly there were many errors and omissions. In this connection, I am wondering if the veterinary teachers and officials of more recent times, or even of today, are meeting the professional obligations in safeguarding and bettering the animal husbandry of our two great countries with fewer mistakes and with more foresight than did the men of a half century ago. They were active in building up the efficiency of the practitioner as well as in exercising their

official duties in the enforcement of sanitary regulations. The technical knowledge now available is vastly greater than that which they had to guide them, but the purpose of the profession and the necessity of preparing and protecting practitioners are the same now as they were then. As one analyzes the problems they encountered, there comes a feeling that they recognized the complexity of the situation and guarded more cautiously every integral part of the composite service necessary to give protection to animal owners than is being done today. Veterinary efficiency means not only official protection against epizootics, but also a requisite number of trained practitioners to aid individual owners. It was the recognition of the value of the teacher, the practitioner and the offiicial, and of the ethical relationship and interdependence among them, that made McEachran strong. We of today have much to learn from the work and teaching of McEachran, Law, Detmers and Salmon.

The activities of McEachran were not confined to veterinary medicine. He was instrumental in the development of cattle breeding in, and the exportation of cattle from, Canada. In 1881, in association with Senator Cochrane, he purchased and was general manager of a large ranch in southern Alberta, where they maintained a herd of some 12,000 cattle and several hundred horses. In 1883 he severed his relations with this ranch and established, with Sir John Walrond, the Walrond Cattle Ranch, consisting of over 37,000 acres of purchased land out of a lease of 300,000 acres in the Canadian Northwest. They started with some 12,000 cattle. In 1886 he began extensive horse breeding with a stock of 250 well-selected mares. He imported several high-class Clydesdale and Shire stallions. This was a valuable asset to the horse industry of Canada. He was a horseman of recognized ability. He often judged at the National Horse Shows, and he was the sole judge of Thoroughbred horses at the World's Columbian Exposition in Chicago in 1893.

At the time of the Boer War he exhibited his ability to meet difficult situations. Because of the nature of the country in South Africa, the British men and horses were having difficulty in overcoming the hardships involved. Lord Strathcona appealed to the Doctor, thinking Canada might furnish relief. McEachran recognized at once that the Alberta cowboys resembled the Boers in their mode of life and work, and that no bet-

ter horses could be found for the task than seasoned cow ponies. These are thoroughly trained saddle horses, accustomed to carry heavy loads, to rush up and down hills, to ford and swim streams and to find their food when turned loose. Men and horses were quickly assembled by the Doctor, who personally selected the horses. This scouting regiment was known as the "Strathcona Horse." A veterinary officer of the British Army in South Africa wrote that the "Northwest horses are the best in the world."

In 1906 McEachran was chosen by the Anaconda Copper Company to direct investigations relative to the effect on animals, in the Deer Lodge Valley, of the smoke from the Washoe Smelter in connection with the suit brought against the company by the farmers of the Valley and known as the Bliss case. To accomplish the desired results and to meet the situation fairly he secured the services of pathologists and veterinarians, among whom were Theobald Smith and Leonard Pearson. He provided a working laboratory and purchased for examination many animals in the Valley that were reported to be "smoked." Characteristic of the man, he provided facilities and material for a thorough study of the case. He never expected good results without adequate provision for them. So well did he do his work that the judge, in his decision, mentioned the basic value of the evidence brought out in this part of the testimony.

I well remember calling on the Doctor at his room in the hotel the evening after he had finished with the court. He said in a tremulous voice, "This is the last of my professional work." But it was not the last of his services. Later in the same year he purchased a large farm near Ormstown, Province of Quebec, where he devoted himself again to horse breeding and in maintaining a dairy. He has been a life-long admirer of the Clydesdales and Shires and has raised many beautiful animals for the market. He has now disposed of most of the farm, but retains his home there.

I have sketched but imperfectly the more pronounced features of the work of Dr. McEachran. Emphasis has been placed on the activities that illustrate best the character of the man. He has been a pioneer in practically every field of veterinary medicine and has always maintained the dignity of his profession. Few men indeed have contributed so much to establish

their profession, to obtain efficiency from its members, to broaden its field of usefulness and to direct all of its activities into a service for the protection of the animal husbandry of their country. While he possessed a love for the work of his choice, his interests and his sympathies have been wide and generous. You who have known him as a teacher understand better than I, better than any of his public acts can convey, the educational and ethical ideals for which he stood. We who know him and his work from without feel that he was ambitious to bring about an understanding of medicine in its best and broadest sense. We of today are but beginning to see the vision of a united medicine that in those early days shone so clearly before his eyes. There is no stronger evidence of his loyalty to his profession and his greatness as a man and a teacher than the sterling quality of the work that has been, and still is being, done by his graduates. We congratulate him and felicitate the University on the many valuable services he has rendered both to his profession and to his country.

Finally, Dr. McEachran, it remains for me, on behalf of the veterinarians in the United States, to extend to you their greetings and heartfelt congratulations on this occasion. We earnestly wish and hope that your years to come may be many and very pleasant. You have labored long and diligently as practitioner, teacher and official, that those who follow you may be better and more useful because you have lived. In all these you have been successful. You should be happy, as we believe you are, to know that your efforts have been productive of much good and that you have laid a foundation on which future generations may build. Now that the cares and the burdens of life are passing, I trust you realize as did the poet that

> Age is opportunity no less than youth itself,
> Though in another dress,
> And as the evening twilight fades away
> The sky is filled with stars invisible by day.

The French national veterinary colleges opened their new sessions in the fall of 1921 with the following enrollment of new students who were admitted on passing the required entrance examination: Alfort, 32; Lyons, 21; Toulouse, 20. Alfort reports 12 veterinarians taking a special post-graduate course in exotic veterinary medicine.

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

CHOREA IN DOGS AND A MONKEY

By W. J. RATIGAN
New Orleans, Louisiana

1. An Airedale, male, past three years of age. Dog habitually ate sticks, pieces of carpet, etc. History of pneumonia contracted at an eastern show; afterwards chorea affecting the antebrachial musculature on the right side. Chorea present over a year, quite troublesome, abated slightly during sleep.

Fecal examination showed tapeworm infestation. Treatment, one-half grain of arecoline per os. I see this dog occasionally in one of the parks. Has shown no evidence of twitching since, as the owner says, "he received the medicine that made him salivate."

2. Newfoundland puppy, male, ten months of age, experienced a bad attack of distemper en route to the United States. The only attempt at medication aboard ship was to give him some sour sirup that he seemed to be fond of. The dog when I saw him was greatly emaciated, temperature about 98, breath very fetid, stools bad, and with a beautiful case of chorea affecting the limbs on the right side of the body and extending into the muscles of the neck.

When this animal got along in convalesence I directed that he receive a tartar emetic preparation four times a day. He had been on sodium cacodylate; had received two ampoules of it (5 gr.). One morning, some time ago, his owner, a trained nurse, discovered that the muscular twitching had suddenly left. Regarding the tartar emetic, as I recall, the dog had been given about six granules. He received them for some time afterwards, on the grounds of "scientific procedure."

3. I was called to see a valuable Airedale matron about to deliver her first litter of puppies. (The owner was unnecessarily alarmed; the event was postponed to another day.) This female had a fairly well-marked twitching of the muscles of the right fore limb. I was told that this condition had been present

since the animal had gotten into the swimming pool in Audubon Park and received a chill. She gave birth to eight good puppies. Her case of chorea has left her.

Everyone carrying on a dog practice of any magnitude is fully aware of the flimsiness of the theories put forth concerning chorea. We are not alone. Physicians are up against it as well as veterinarians.

4. Another case, perhaps of some interest, comes to my mind. Early last spring I amputated the penis of a large specimen of one of the South American monkeys in the New Orleans Zoo. (I perform this operation after castration in these animals as the only positive way of eliminating self-abuse.) This animal was given 1,500 units of tetanus antitoxin the evening after the operation; he had been operated upon in the morning. The following day I was notified that something was the trouble with one of its arms. This monkey never has shown any improvement. It is a "twitcher" still.

RUPTURE OF THE UTERUS IN COWS

By JOHN P. TURNER
Washington, D. C.

Three cases of rupture of the uterus during parturition have come under the writer's observation recently, which may be of some interest in the study of prognosis in these cases.

1. A grade Holstein-Friesian cow, second calf, having difficulty in calving, was attended by a colleague of the writer, and after delivery was found to have a ruptured uterus. An unfavorable prognosis was made, but much to the veterinarian's surprise, the cow recovered and became profitable. The owner was advised by my colleague not to breed this cow. Contrary to advice, she was bred and recently calved without any assistance or unusual postpartum condition occurring.

2. Grade Holstein-Friesian heifer, two and one-half years old, had been in labor several hours and had been receiving assistance from the owner. Examination showed a posterior presentation, with flexion of the hind legs at the tarsus, the latter being caught in front of the pubis. Inasmuch as the buttocks of the fetus had been drawn into the pelvic cavity to a considerable degree, it was not possible to note whether or not any injury

had occurred to the cow. As repulsion was not practicable, both tarsal articulations were crushed with the osteotrite. After injecting a quart of petrolatum oil into vagina the calf was delivered without difficulty. The usual examination was made and a large tear was found in the side of the uterus, caused by the intense pressure of both hocks against the pubis. Owing to the length of time that the heifer had been in labor and the fact that the placenta was tightly adherent, together with a condition of decubitus, a fatal prognosis was made. The heifer died the following day.

3. Grade Holstein-Friesian cow in labor with second calf. Cow was in excellent condition. Had been in labor several hours and herdsman was unable to deliver the calf. Found conditions identical with case No. 2, save that the cow was on her feet. The calf was repelled and each hind foot was carefully brought into position, protecting the mother by the proper position of the operator's hand. After injecting a quart of petrolatum oil into the vagina the calf was delivered with but little effort. Examination revealed a large tear in the side of the uterus, permitting the hand to touch the rumen and small intestines. The placenta was easily removed without using any traction. Prognosis grave, but some hope was entertained owing to the excellent physical condition of the cow. She was made comfortable in a large parturition stall and after 24 hours ate a bran mash and some ensilage. Recovery was rather slow and some vaginal discharge persisted for a month. The cow was not treated in any manner, save some stimulants for two or three days. Within two months she had regained her condition and became a profitable milk cow.

When she came in estrum about four months later, vaginal and rectal examination showed the vagina and uterus to be so nearly normal that she was bred and is now pregnant.

Procaine is the American name for the older German product which was known by the name novocaine. This German novocaine was never made in this country and is not made in this country now. The word novocaine is used today by one of the three manufacturers of procaine as its trade name. The American made product, procaine, is the equal if not the superior of the original foreign made drug.—*H. E. Tompkins in New York Medical Journal.*

ABSTRACTS

THE BASIS OF NON-SPECIFIC IMMUNIZATION. E. F. Mueller. Deut. Tierarztl. Wchnschr., vol. 29 (1921), p. 513.

There is no drug capable of destroying bacteria that have invaded an organism. This must be accomplished by the organism itself through its defensive reactions, initiated by the bone marrow. Recovery from an infection will depend not alone upon the extent of the defensive reactions, but also upon the speed with which they are mobilized. Early treatment is very desirable. Irritating or toxic substances are not suitable for non-specific treatment, for although they might stimulate strong defensive reactions, the newly released energy for defense might be entirely consumed in the elimination of the toxic material injected. The injection of turpentine produces a marked increase in leucocytes, but these are not therapeutically effective because they are used up in eliminating the turpentine. Desirable therapeutic agents stimulate the defensive organs powerfully without requiring much energy for their elimination. Substances that cause fever are not desirable in non-specific treatment.

Specific aggultinins may be increased by non-specific treatment. Thus in an animal immune to *B. typhosus,* whose serum diluted 1:3000 will agglutinate *B. typhosus;* the non-specific treatment will raise the agglutination titer. This is one of the best proofs that the material injected does not directly influence the disease process: it can do this only in so far as the remedy injected can stimulate the defensive powers of the invaded organism.

The basis of non-specific treatment lies in the animal and its available defenses. W. N. BERG.

DESTINATION OF AVIAN TUBERCLE BACILLI IN THE BODY OF THE WHITE RAT. Y. Watanabe. Jour. of Bact., 1921, No. 309. Abs. in Japan Med. World, vol. 1 (1921), p. 20.

In his previous work the author experimented on the natural immunization of the white rat against bovine tubercle bacilli. In the present communication he deals with the resistance of the white rat against avian tubercle bacilli. He injected 1/50th milligram of a slightly virulent avian tubercle culture into the

peritoneal cavity of a white rat, and the peritoneal juice was then collected by means of glass tubes. With this material, he tried to cultivate the organism. He examined the kinds of cells produced in the peritoneal juice and also the power of the phagocytosis. The experimental animal was then killed after a certain interval and its great omentum, mesentery, spleen, liver, lungs, kidneys and lymphatic glands were examined. A similar experiment was made by injecting the bacilli into the vein and also under the skin. By reviewing the results be obtained the following conclusions:

When 1/50th milligram of avian tubercle bacilli was injected into the peritoneal cavity of a white rat, a greater part of the injected bacilli was taken up by the intraperitoneal cells in 5 minutes as in the human tubercle bacilli and in 24 hours no bacilli remained free in the cavity. The phagocytosis was chiefly effected by the hystionic small mononuclear cells and large mononuclear cells, or in other words, macrophages. A part of the injected bacilli reaches the mesentery, where they form nodules, which usually begin to disappear from the 24th day, some nodules leaving traces after the disappearance. All the remaining bacilli penetrate into the great omentum, where they completely disappear. Human tubercle bacilli take about 100 days to effect it, while avian tubercle bacilli take about 40 days.

When the bacilli are injected under the skin they enter the cell body in the injected locality, rarely enter the lymphatic system lying near the injected site, and make a swelling there. The bacilli which enter either the cells or the lymphatic system disappear soon. These phenomena are the same as in the human tubercle bacilli.

If they are injected into the vein, they are carried on into the lymphatic system, the lungs and other viscera, but all of them sooner or later disappear. In the lungs they are found for a much longer period than in any other viscus, while the formation of nodules is more prominent in the lung than in any other organ.

In the previous work, which was made with bovine and human tubercle bacilli, the author concluded that if the white rat is naturally immune against tuberculosis, the cause of this natural immunization is nothing other than the constant phagocytosis that is carried on by the living cells, especially the large mononuclear phagocytes, endothereal cells and the cells in the

nodules of the lymphatic glands, and the natural defence against the injected tubercle bacilli is complete only when they are made to pass through the endothereal cellular tissues or through the lymphatic nodules. From the results he obtained with the avian type of tubercle bacilli, he concludes that his former conclusion as to the natural immunization of the white rat against tubercle bacilli has been further confirmed.

ETIOLOGY AND PROPHYLAXIS OF LUMBAR PARALYSIS OF SHEEP. Tsuruma Ito. Jour. Cent. Vet. Soc., vol. XXXIV (1921), No. 4. Abs. in Japan Med. World, vol. 1 (1921), p. 19.

The author carefully examined the feces of the sheep suffering from the disease, which prevailed in Formosa, and found almost without exception the eggs of anguillula. From this fact, he conjectures that the disease must be due to the transmigration of the larvæ of anguillula into the subarachnoid spaces. If this be true, the prophylaxis of the disease seems very simple, for it will require only the prevention of the infection from anguillula.

FURTHER NOTES ON THE ETIOLOGY AND PROPHYLAXIS OF LUMBAR PARALYSIS OF SHEEP. Tsuruma Ito. Jour. Cent. Vet. Soc., vol. XXXIV (1921), No. 5. Abs. ibidem.

The author gives a supplementary note on his previous work which is referred to above. He tested microscopically the central nervous system of sheep dead of lumbar paralysis and found in the subarachnoid spaces and the spinal cavity a number of the larvæ of anguillula, while from the intestinal mucous membrane he recovered anguillula, which is most probably *Anguillula intestinales*. Thus he affirmed his former supposition.

A DIAGNOSTIC TUBERCULIN. E. Moro. Münch. Med. Wochenschr., vol. 6 (1920), p. 1524. Abs. in Amer. Rev. of Tubere., vol. 5 (1921), p. 187.

In doing routine diagnostic tuberculin tests in his clinic, Moro noticed a sudden falling off of the number of positive reactions. On checking up this phenomenon by the use of five different makes of tuberculin, he found that while some products gave strong reactions, others gave either very weak ones or none at all

on the same individual. All these products were presumably of standard strength, as they had been stamped "government tested," but investigation showed that this test consisted in the injection of a given amount of the product in question into a tuberculous guinea-pig. If the pig died within twenty-four hours the tuberculin was approved and put on the market. Substances like *cutine* must be present in a tuberculin in order that it may give reactions in the human skin. Therefore a clinical test is also necessary before the product is put on the market for diagnostic purposes. Experiment showed that cultures with the most prolific growth yielded the most potent tuberculin, and further, that a partial concentration of the old tuberculin increased its reactivity. Moreover, some children with pure bovine infections would react to bovotuberculin only, and others with pure bovine infections reacted to tuberculin of human origin only; but owing to the far greater preponderance of bovine infections the human tuberculin was of greatest value. The author then devised a tuberculin the composition of which he summarized as being "old tuberculin, made from selected stock cultures, partially concentrated, containing a certain proportion of bovotuberculin, and strongly enriched with cutine." This product he has used for some months with entire satisfaction.

SWINE ERYSIPELAS AND ERYSIPELOID (IN MAN). G. Düttmann. Beitr. Klin. Chirurg., Tübingen, vol. 123, p. 461. 1921. (Abs. in Jour. Amer. Med. Assoc., vol. 77, p. 1455, Oct. 29, 1921.)

Düttmann has observed 8 cases recently which he is convinced were instances of rotlauf in man. The source of infection from a pig with the disease was known in three of the cases, but in the others there was no suspicion of the origin of the symptoms in the patient, and erysipeloid had been the label. In his cases as also in four reported by Schmidt in the following article, recovery was complete in from one to three days under serotherapy.

Professor of Chemistry: "If anything should go wrong in this experiment, we and the laboratory with us might be blown sky high. Come closer, gentlemen, so that you may be better able to follow me."—*Journal of the American Medical Association.*

REVIEW

DISEASES OF THE SMALL DOMESTIC ANIMALS. By Oscar Victor Brumley, V. S., Professor of Veterinary Surgery and Director of Clinics, College of Veterinary Medicine, Ohio State University, Columbus, Ohio. Published by Lea and Febiger, Philadelphia, 1921. Price $4.75.

There is a comparatively limited number of up-to-date scientific works available which treat of diseased conditions in the small domestic animals. This publication, which gives consideration to diseases, both medical and surgical, of the dog, cat, and domesticated birds, is for this reason almost certain of meeting with sincere appreciation, but there are other and more important reasons why it will be highly esteemed by the veterinary student and busy practitioner for whom it has been prepared.

It is sufficiently comprehensive to include practically all abnormal conditions with which the practitioner may come in contact and furnishes descriptions of them that are clear, concise and to the point. The admirable arrangement of the contents is furthermore a feature that promptly attracts attention and testifies to the author's wide experience in the presentation of the subject to students. Despite the announcement that originality is not claimed for all the material in the book, it is recognized that the information it imparts is based to a great degree upon personal experience, and moreover upon an experience sufficiently broad to engender confidence in the minds of readers as to its authenticity.

The work is divided into fourteen parts bearing the following headings: Part I, Diseases of the Respiratory System; Part II, Diseases of the Circulatory System; Part III, Diseases of the Digestive Tract; Part IV, Diseases of the Reproductive Organs; Part V, Diseases of the Blood and Blood Producing Organs; Part VI, Diseases of Metabolism; Part VII, Diseases of the Organs of Locomotion; Part VIII, Diseases of the Urinary System; Part IX, Diseases of the Nervous System; Part X, Diseases of the Skin; Part XI, Diseases of the Ear; Part XII, Diseases of the Eye; Part XIII, Hernia; Part XIV, Infectious Diseases.

The parts enumerated are subdivided into chapters, a chapter usually being devoted to a discussion of the abnormal conditions that may involve a particular organ or area. One entire chapter of Part III gives consideration to intestinal parasites.

Infectious diseases, which constitute Part XIV, are classified in such a manner as to comprise five chapters bearing the following captions: Acute General Infectious Diseases; Acute Infectious Diseases with Localization in Certain Organs; Infectious Diseases with Special Involvement of the Nervous System; Chronic Infectious Diseases, and Infectious Diseases Produced by Protozoa.

A large proportion of the 57 chapters comprising the subject matter includes a description of a systematic means of diagnosis with reference to the organ or part considered, a feature recognized as highly advantageous.

The surgical procedures described are not entirely confined to those indicated for the alleviation of diseased conditions, but include also discussions of the technic employed in castrations and oöphorectomies of the different species of small animals.

The work consists of 636 pages exclusive of index. It is a decidedly compact volume, being especially adaptable to student needs in this respect. Practitioners will find it exceedingly helpful as a reference volume inasmuch as it gives consideration to methods of prevention and treatment of disease that are in harmony with present day knowledge. J. M. B.

AN ITALIAN VETERINARY ANNUAL

An interesting and valuable Italian Veterinary Annual for 1921 has been issued under the editorship of Prof. A. Bartolucci of the Serotherapeutic Institute of Milan. Besides information and data that are undoubtedly useful to the veterinarians of Italy it contains much that is of general interest. Italy has nine veterinary schools, two of which are attached to universities. The degree conferred on graduates is "Doctor in Zootiatry." The register of veterinarians in Italy contains 2,846 names. The Army Veterinary Service comprises 2 colonels, 10 lieutenant colonels, 26 majors, 86 captains and 64 lieutenants. These figures, however, are slightly in excess of the numbers provided for by the new law. Italian veterinary journals consist of two weeklies, two fortnightly publications and three monthlies.

ARMY VETERINARY SERVICE

ARMY HORSES AND THE ARMY REMOUNT SERVICE

By FREDERIC M. PERRY
Framingham, Mass.

OUR Army Remount Service, like our entire reduced American Army, seems to wax and wane through the years according to the size of the appropriation allotted, both, in fact, seeming to be treated somewhat as footballs by Congress and people alike.

But regardless of the advent of the motor vehicle, including the tractor, our Army, as every other army, must have public animals, if men and "material" are to be moved at will over all kinds of terrain and in all weathers. It was largely due to the comparatively short distance between our ports and those in the European war zone that our great country furnished the bulk of the horses and mules to the Allies during the World War. It must be conceded that while our mules are the finest big mules in the world, and our heavy horses are of high average, the amount of horse stock really fit for the mounted service is exceedingly small, so small as to be almost negligible. In fact, it is said that we now possess in the entire country barely enough horses of true riding type and quality on which to mount a regiment. Of course we all know what has brought this condition about, thus causing our Army to be very poorly horsed, certainly so for the past 15 years at least; though the writer can easily remember when the average troop horse was a very sturdy, nicely turned and handy animal, having some quality withal. With the decline in the quality of animals furnished the mounted service, there has been corresponding lowering of average quality in equitation. All of which is to be keenly regretted by the horse lover and those favoring the field artillery or the mounted arm. The case is not helped any when every practical horseman knows that America, all the Americas in fact, are eminently adapted for the raising of high-class, quality horses, and that the laws of correct breeding are now well known on this Western Hemisphere. Some of the best equine blood of the world has been taken to South America, notably to the Argentine Republic, her breeders paying at public auction with lavish hand, and

many of the descendants of the early progenitors there were drawn into the World War and found their way to the land of their sires.

For many years the Argentine has been most partial to running races on the flat. There is only one breed that can produce successful candidates for that liveliest of all sports, namely, the English Thoroughbred; and to this breed we owe the peculiar ability to give to its produce the best backs, withers and shoulders suited to the riding horse.

While overseas the writer chanced to visit several of the French Army remount depots, and in each instance was shown the various classes of horses by the chief veterinary officer. Those from the Argentine interested me the most of all, for they approached the nearest in type to the requirements of the Army remount. There were received, seemingly, two general classes of horses from that country. One averaged slightly under 15 hands in height, but of that much-desired conformation adapted for saddle work; strong, straight backs, sweeping up into moderately high withers and well-sprung ribs, offering just the place to lay a saddle, and where it would most likely stay; nicely sloping shoulders and unusually good heads. "No foot, no horse," of course, but so good to look upon were the parts above mentioned, and which are now so seldom seen in the average animal offered at our great horse markets, that aside from the legs being well placed under, the details of legs and feet are now hazy in mind; while the lines of backs, withers, shoulders and heads are stamped indelibly upon the memory. So good indeed were these little Argentines that, conformation alone considered, many of them would have made polo prospects. A larger class of horses from the same country were shown weighing around 1,100 to 1,150 pounds, used for ambulance and transport work; without as much quality as the other, perhaps, yet very excellent animals and much like our highest class express horses. This matter of skeletal formation, anatomically correct, mechanically perfect, if you please, is dwelt upon at length because of its prime importance to the animal required to carry weight and at speed.

A span of proper type and length, upheld by four columns of great tensile and supporting strength, properly placed and each resting upon its hard, yet resilient pedestal, the hoof. Out in the range cattle country one frequently hears this or that horse referred to as a good "cutting horse" in distinction from others;

and almost invariably we find the animal to have just those desired points of skeletal structure here considered, and the whole clothed with hard muscle, massed at the right places, haunch, thigh, back and shoulder, and all driven by a highly developed brain and central nervous system giving him a quick eye, unerring judgment and instant action. His very build, along with the large, well-placed hocks, heavily muscled quarters and back and developed shoulder, allows him to possess that power of first importance in the saddle horse, called balance, enabling him to play his role as acrobat or first-class equilibrist in carrying his extra human load. If his rider also develops and holds this valued thing called balance, then there is unison of team play and accord of even more than smoothness of mechanical perfection. And while our "cutting horse" has received since colthood the A-B-C's of Nature's own supplying exercises, through his strenuous life on the range, the polo horse, stable raised, must acquire through a long course of training this art of balance at speed, of withstanding shock of stop and turn, for the work of both is similar. And the soldier's horse, the Army horse, like the cutting horse and the polo horse, requires much the same power in build and ability to play his appointed role of troop horse or charger. Such, properly bitted, trained and ridden, does not easily tire, wears well, and is therefore the efficient animal.

In these same remount depots many United States and Canadian horses gave abundant opportunity to make comparisons; and some one has fitly said, "Comparisons are odious." The veterinary officers explained also that the Argentine horses would come away through on a thirty or thirty-two-day voyage, in many instances without the loss of a single animal, or at most a loss of one or two per shipment; landing in nice, smooth, thrifty condition, practically without a case of influenza or shipping fever. Their appearance certainly supported this seemingly wild statement. Contrast this with the condition of many of our horses and mules consigned to the French Army with widespread infection and losses per shipment on voyage of only 12 to 15 days reaching in some cases as high as 10 to 12 per cent. Of course there is much to be said in explanation of this wide difference in the physical condition of the animals of the two Americas and its contributing causes.

To digress a moment—was not infection in the United States animals superinduced by such as the following factors: Bought

by contractors off of farm or range at an altitude anywhere from 500 to 2,000 feet above sea level, rushed to shipping points and to stock pens, corrals and stock cars, all more or less loaded with infective matter, including ramps, feed and water troughs, etc.; unloaded at Army purchasing centers, only to proceed later perhaps a thousand miles down to the seaboard; subjected to varying temperatures and surroundings, inviting infection at every stage?

Contrast this with conditions obtaining in our neighbor to the south of us. The bulk of the livestock of the Argentine is bred and raised at a low altitude. From personal observation there some years ago, one may walk right out of several of the seaport or riverport cities—Bahia Blanca, Buenos Aires, San Nicolas or Rosario—and come at once into the open agricultural country, resembling that of our own central West, making it therefore possible in many places to drive animals direct from estancia to steamer's side, or at most, with short rail haul. Did not these last-named conditions help in avoiding the dangers of infection?

There may be still another contributing factor. The greater number of horses seen at our principal horse markets throughout the country today carry a large proportion of draft blood, tending toward the cold, phlegmatic type, indicating low resistance and "weak" mucous membranes; while the type of South American horse herein referred to seemed to show a large infusion of warm or Thoroughbred blood, giving a denser bone, a firmer muscle and more highly developed central nervous system. Might not also these latter qualities also be accompanied by a high power of resistance to infection?

Without meaning to stress unduly the great merit of Thoroughbred blood as the only blood for our Army remounts, we are, nevertheless, confronted by some very stubborn facts in the case. The Thoroughbred has made the running race-horse what he is, the Irish hunter what he is, and the polo horse—the horse said to combine more power and high qualities in actual performance wrapped up in one animal than in any equine living today—this wonderful blood has made him what he is. But beyond all this again we must make our lowest bow of veneration to the Arab, the desert horse, that long ago made the Thoroughbred what he is. Preeminent in endurance, courage, docility and

intelligence—all indispensable fundamentals of the military horse and for the upbuilding of our Army remounts—the Arab lacks only in number to permit the fullest flow of this richest ancient blood to the light horse stock of the country.

Much to be regretted is the fact that the vast majority of the Thoroughbreds either raised in or imported to this country have been of the extreme racing type, possessing few other traits to attract the average horse lover, whence the false impressions of the breed and the prevailing prejudice against it. However, all breeders of the Thoroughbred in America did not seek for this extreme greyhound type; notably so the late J. C. Haggin of California and Kentucky, where on his estates were produced crop after crop of Thoroughbreds, superb animals of great substance, body and bone and with unusual docility, the sort that "fills the eye" and made it more than pleasure to view them at short range. Thus proving that this breed of desired type and quality can be raised here if demanded, and that it is, as also the Arab, essentially the same here as in South America, Australia or throughout Europe; proving further the recent contention of the eugenist, ethnologist and zoologist that breed is stronger than environment. And while our Remount Service is also using American Saddle Horse, Morgan and Standardbred blood—breeds of our own American origin and all having high merit—special emphasis seems recently to have been placed upon the Thoroughbred and Arab, the blood that gives the propensity to run, the galloping horse.

Though little has been proven, taken by itself, is it not, however, significant that of all the breeds competing in the long-distance endurance race of 300 miles, open to all comers and held for the past three seasons, instituted by the Army and the American Remount Association, the winners in each contest and the horses that really endured were horses carrying large infusions of either Thoroughbred or Arab blood close-ups? While the American Trotter or Standardbred is not altogether just the type we might choose to produce the military horse, being a trifle too long in the back, a little low in the withers, straight in the shoulder, and with inborn tendency to trot, still he is a warm-blooded race-horse, intelligent and tractable; his breed is widely disseminated throughout the country, being the most available for foundation stock of all our strictly American

breeds; moreover, certain strains and families, such as Mambrino King and his get, have even been famous show horses. The insistent commercial demand will doubtless continue to regulate the supply of the draft horse, the heavy horse, without artificial stimulus; but the present optimistic view of the members of our Remount Service toward obtaining from the farms of the country suitable light remounts for the Army seems to the writer, with the many facts before us, practically unjustified. Principally because the light horse, the riding horse breeding proposed and already projected and largely to be done by farmers, would produce an animal, even though up to 1,100 weight, that would be almost useless to the American farmer today, and the culls or "rejects" from our Army purchasing boards would be nearly unsalable and a distinct loss to the breeders and without commercial incentive, how shall the farmer breeder be induced to grow and offer suitable remounts to the Army? One earnest military member has suggested that the way out is for the Army to breed and raise all of its own remounts according to its own standards and specifications, the Government to take its loss in the public sale of its "rejects." Factors of cost aside, this method would have one outstanding virtue, practically to insure the production of the much-desired "specification horse," which up to now few of us have ever seen in American military service.

Is it any cause for pride to know that nearly every other country, little and great, furnishes its Army with animals superior to those of our own? Is it pleasant to know that it is officially reported that the mounted drill, the mounted work at the R. O. T. C. and civilian military training camps held in one of our Pacific Coast States the past summer could not be effectively carried out owing to inability to obtain sufficient suitable saddle animals for the purpose? And this in our great country, with immense pastures, abundant forage, suitable climate and foundation stock, and with thousands of our people skilled in the breeder's art. The lines of correct horse-breeding for military purposes are now clearly and definitely marked, and the blood preeminently suited to make the blend with American female stock thoroughly well known to those trained and experienced in this combined science and art.

Any veterinarian who has seen military service knows full

well that a commanding officer (line) of a post or camp cares little for even the most astute logistics of diagnosis or of treatment, representing the last word in niceties of surgical interference or medication. He wants as few animals as possible on the sick lines, on sick report, from any cause. In a word, he is chiefly interested in being furnished as good animals, class and type, as the Government will pay for, and that such animals shall receive such care as will maintain high health and efficiency.

Animals of various classes and types must therefore be selected, bought, shipped to depots, together with forage, etc., an enlisted personnel selected and trained to assist in their care, and happily, under our present military policy the breeding and raising of Army remounts has now also been included. But should not just such duties and responsibilities, from their inception, breeding included, fall strictly within the province of the Veterinary Corps? And shall we merit the term "animal engineers" given us by one whose name we will revere, if we meekly permit laymen to shoulder one whole department of our engineering for us? What inducement to enter the military service shall we hold out to the young aspirant to the veterinary degree, if he learns that upon accepting such a service he will quite likely report to, be commanded and perhaps always outranked by officers of another corps, in most cases untrained in his special field?

To be sure, our friends of the Quartermaster Corps may retort that veterinarians are untrained and ill adapted to handle big business in a big way; but in reply we point to the work of the United States Bureau of Animal Industry, now extended nation wide and performed and supervised almost entirely by veterinarians. For one, I have not only bought and shipped commercial classes of horses and mules for clients but have always broken and educated my own colts and horses, from initial work on the longe, bitting and saddling to their complete education, conditioning them, selecting the forage, etc. If there is one there are hundreds of American veterinarians who have done or can do the same thing, all of which processes are of the character of remount work done in miniature, to be sure. Yet do such men need to go to school to the Quartermaster Corps to learn animal management?

It is an axiom of commercial life that correct means, methods, processes once discovered or devised, their duplication and application to quantity production becomes largely a matter of mechanics and arithmetic. At Camp Johnston, Florida, during the war, young officers of the Quartermaster Corps, in training, were being taught how to care for public animals at sea, a duty it is doubtful they would ever be called upon to do as long as an officer of the Veterinary Corps, a farrier sergeant or stable sergeant could stand on his feet. Why this needless duplication and overlapping of services?

A British Army officer overseas, watching one of our veterinary mobile sections passing, is said to have remarked: "The American Army Veterinary Corps is forty years behind the times." The Britisher was unaware that when he spoke the Corps was only one year old.

If we are to attract to the veterinary profession first-class timber, has not the time already arrived to make every effort to widen and deepen our field of endeavor in every legitimate way, advance our Army Veterinary Corps forty years *ahead* of the times if need be, to the end that greater service can be rendered our common country by maintenance of an improved horse supply, and so, as animal engineers in fact, do our tiny bit to make the United States Army the army of highest quality that it now aims to be?

MAJOR AND MRS. PICK ENTERTAIN AT CAMP TRAVIS

Major and Mrs. W. R. Pick, of 2d Division, Camp Travis, Texas, entertained the veterinarians of Fort Sam Houston and their wives and the Camp in a most unique manner, November 28, as an appropriate termination to the horse show.

After the guests assembled, twenty original conundrums having horsey terms for answers were puzzled over. Lieut. Reynolds and Lieut. Buffin tied the score for gentlemen's prize, and Mrs. Hodge won ladies' prize.

Each guest responded with a two minutes' performance, which resulted in a great exhibition of talent. The program consisted of original poems, caricature drawings, recitations and readings, interspersed with music, which was greatly enjoyed by all. The

winners were decided by ballot. Mrs. Reynolds, Mrs. Miner, Capt. Hodge and Lieut. Reynolds won prizes. A salad course was served.

Those present were Col. and Mrs. Lusk, Capt. and Mrs. Hodge, Capt. and Mrs. Eagan, Lieut. and Mrs. Buffin, Lieut. and Mrs. Reynolds, Lieut. and Mrs. Miner, Lieut. and Mrs. Rife, Lieut. and Mrs. Dildine, Lieut. Pickering, Lieut. Seymour, Major and Mrs. Pick and Misses Victoria and Sara Pick.

The Belgian Government has issued a decree prohibiting the exportation of Belgian draft mares and fillies of the age of 18 months or more, also of stallions of this breed which have been awarded certain premiums or bounties. Such stallions may be sold only to Belgians established in Belgium. Other horses may be exported under conditions prescribed in the decree.

A memorial tablet to Belgian veterinary students and veterinarians who lost their lives in the war, was recently placed in the Belgian Government Veterinary School with appropriate ceremonies which were participated in by Baron Ruzette, Minister of Agriculture; Colonel Migeotte, Chief Veterinarian of the Army; Dr. Gratias, director of the school; members of the faculty, graduates and students. The names of the honored dead were listed in three catagories—(1) students killed at the front. (2) veterinarians killed in the Army service, and (3) "civilian veterinarians shot."

Dr. J. W. DeMilly resigned as State Veterinarian of Florida on January 16 to accept a position with the Lederle Antitoxin Laboratories of New York. Dr. DeMilly will be succeeded by Dr. J. V. Knapp, who has been a member of the Bureau of Animal Industry since April 7, 1913, and for the past seven years has been engaged in tick-eradication work in Georgia and Florida. Dr. Knapp is thoroughly familiar with the live-stock conditions in the South and is well qualified for the position of State Veterinarian. THE JOURNAL extends to both Dr. DeMilly and Dr. Knapp its sincere wishes for their success

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A New York peddler has just bought a horse with a wooden leg. We fancy it must be the one we put our money on in the two-thirty the other day.—*London Punch.*

ASSOCIATION NEWS

AMERICAN VETERINARY MEDICAL ASSOCIATION

Proceedings of Fifty-Eighth Annual Meeting, Denver, Colo., September 5 to 9, 1921

(*Continued from the January* JOURNAL)

TUESDAY MORNING, SEPTEMBER 6, 1921

JOINT MEETING OF SECTIONS

The combined session of the sections on General Practice, Sanitary Science and Police, and Education and Research convened at 10 o'clock a. m., Dr. H. W. Jakeman presiding.

CHAIRMAN'S ADDRESS

Dr. Jakeman presented an address as Chairman of the Section on Sanitary Science and Police, as follows:

In accordance with a precedent established in the various sections of our Association, I have been placed on the program as chairman of this section for an opening address. While endeavoring to think of a suitable subject for the occasion it occurred to me that some benefit might be derived from the expression of a few thoughts concerning the future of our profession. The subject is one, of course, of paramount importance to all veterinarians, but it appears to me that livestock sanitary control officials in their diversified fields are most vitally and fundamentally associated with the task of molding the future of the veterinary profession, and that the subject is therefore an appropriate one for discussion before this section. Representing a progressive type of the profession, constantly before the public eye as Federal or State officials, and by virtue of the scope and nature of their professional activities, livestock sanitary control officials are carrying a great responsibility to the veterinary profession, and they can not rest on laurels of professional achievements but must give due consideration to the problems confronting the future of the profession.

I trust that the remarks I have to make will not be misconstrued nor considered of a pessimistic nature. They are offered as constructive criticism or food for thought, and are not intended to reflect on the progress or efforts of the past nor on the loyal and staunch supporters who have borne much of the burden of progress.

The veterinary profession has been and is going through a transitional or readjustment period, a period critical to the future status of the profession and one which is causing many to ponder over the outlook. We often hear such questions as: What standing will the veterinarian eventually occupy in the realm of science or the learned professions? What effect will the present low student enrollment in our colleges have in the immediate future? How are various farmers' organizations going to affect the future of the veterinarian? These and many more similar questions so often heard signify an existing element of doubt in the minds of many as to the future of the profession. It appears to me that the time is at hand when all doubt or uncertainty should be set aside and a greater, more con-

centrated effort made to overcome the conditions which are delaying progress and which are responsible for this feeling of uncertainty.

While many are too much inclined to see and resign to the uncertainty of the future, there are, on the other hand, too many thoroughly convinced that with the numerous possibilities for developing new and old fields of endeavor, the increased value of livestock and the higher entrance requirements of our schools, together with the extended time necessary to complete a course in veterinary medicine, the future of the profession is assured. Optimism is essential and is well warranted, for the basic structure of the profession has been well laid and advancement has been rapid; but optimism or previous achievements do not assure the future unless existing conditions are fully realized, an adjustment is made to meet new demands and advantage is taken of every opportunity to advance the profession as such.

A great deal has been accomplished during recent years in improving the educational standard of the profession. Furthermore, the profession has rendered a wonderful service in controlling outbreaks of infectious diseases, safeguarding human health and in contributing to the advancement of scientific knowledge. Has the profession advanced to the extent which it should have by virtue of these achievements, or has it rested in excessive confidence that educational advancement, service and scientific attainments assured the future? Has it not overlooked, or at least neglected, the capitalization of its own merits and achievements in a manner which would create a much more favorable public impression than that which generally exists? It would almost appear, with the present various branches of veterinary endeavor supplanting the days when the treatment of a few species of animals constituted its principal sphere of work, that the profession had become timid or fearful of the possibilities and responsibilities which its comparatively recent development has brought about. Such a condition is, of course, detrimental to advancement. Confidence and a determined, far-reaching propaganda directed toward public enlightenment as to the real nature of veterinary science are probably more needed at present than at any time in the history of the profession. Public demand or appreciation is the foundation of future development. It must be developed and fostered by keeping the profession and its achievements constantly before the public, or, in other words, the profession must familiarize the public with what it is accomplishing, with its educational advancement and the scientific public service it is rendering. If left to the mercies of those we serve, the advancement of our professional standing will be, to say the least, slow.

In a recent issue of the A. V. M. A. JOURNAL a correspondent of *The Veterinary Record* was quoted as follows: "The correction of an erroneous public impression of the standing of the profession comes better if not too consciously sought, and to take leave of the modesty becoming a profession hardly illustrates the adaptation of adequate means to ends."

The conservative idea thus expressed is no doubt true if certain methods for correcting public impression be adopted—methods involving extreme claims or boasting. There are, however, numerous ways in which the public could be enlightened as to the real nature of veterinary science without departing from any obligation to professional modesty and which would result in increased appreciation. "The strength of the chain rests in its weakest link," is a saying in many instances applicable to the opinion held concerning the veterinary profession as it is often judged by men professionally or personally known to certain individuals. In order to standardize the

profession to the public its collective strength must be placed before it in such a manner that the profession as a profession will be placed beyond the standardizing influence of environment or local recognition. A profession in the role of protector to an industry representing practically ten billions of dollars, and one which, besides its economic significance, bears such an important relationship to human health, is surely entitled to bring these things before the public in the interests of the livestock industry and human health as well as for the advancement of its own standing.

Unfortunately, a considerable amount of work carried on by veterinarians is not being credited to the veterinary profession. In the field of preventive medicine the veterinary sanitarian is indispensable and his usefulness and importance in this work are constantly growing. It is surprising and deplorable, however, that men engaged in this branch of veterinary science are frequently not associated by the laity with the veterinary profession at all, but are thought to have had some special medical training fitting them for this particular work. That such a condition should exist is the fault of the profession or of the individual and needs correction.

In reviewing the accomplishments of Federal and State livestock sanitary officials during the past year, one can not help but feel that the truly wonderful work of these men in controlling livestock losses is a thing altogether too much taken in the course of events by veterinarians themselves, not understood nor appreciated by the public, and therefore not being capitalized for the advancement of veterinary science. With practically all countries outside of the United States and Canada suffering great losses from various infectious diseases, due, as Dr. Mohler has pointed out, to the inability of these countries during the war to give proper or usual attention to the suppression of infectious diseases of animals, the North American Continent is enjoying comparative freedom from serious livestock losses and has been protected from an invasion by any of these non-indigenous diseases. The magnitude of the work involved, the efficient service rendered and its economic significance are in themselves justification for a different standing and appreciation than that which the profession enjoys.

The accredited herd plan is another illustration of a work which should be capitalized to the benefit of the profession. This wonderful undertaking, carried on by Federal and State veterinarians, although in its infancy, has already developed to a point where over 125,000 animals are being tested for tuberculosis each month. The great importance of this work to the livestock industry and to humanity can hardly be estimated. In the interests of veterinary science it certainly should be given more publicity, not only to the farmer and those directly interested, but to the medical profession, antituberculosis societies and to the general public.

The veterinary profession is not, openly at any rate, cooperating with the various medical societies nor with the antituberculosis societies of the country as it should be. Such a cooperation would do much for the future of our profession and materially assist in improving its standing. It should be more forcefully pointed out to the medical profession that the veterinary profession of today is no longer confined in its activities to the treatment of sick animals, but that it is one embodying the scientific principles of preventive medicine and having no small amount of significance in relation to human health in addition to the protection afforded our great and growing livestock industry.

Before leaving the subject of public appreciation, I wish to mention the odious condition existing in one of our States as a result of

recent State legislation regarding vaccination of swine by the farmer. While factors other than lack of appreciation were no doubt instrumental in bringing about such a condition, it aptly illustrates the need of public enlightenment regarding the veterinary profession.

Another matter affecting the future of the profession and concerning which collective strength or pressure must be brought to bear is the remunerative possibilities of the veterinary profession and the compensation given Federal and State livestock sanitary officials. The latter problem has been attacked, although I believe the matter is at present in abeyance. Largely as a result of loyalty, these departments have retained highly qualified and capable men for carrying on the important work they do, although there have been difficulties in this connection. What of the future? Can we expect men of high professional qualifications, the progressive, ambitious type, desirable for this work, to be induced to take it up when other fields of endeavor offer a great deal more by way of compensation? With increased entrance requirements to our schools and a period of study equal to that required by most and more than many professions, the prospective student looks for tangible examples of what his earning possibilities will be. An average made on a strictly professional earning basis will not look very favorable for the veterinary profession. Is this not one of the principal reasons for our present low college enrollment? When will it change, and what are we doing to change it?

Looking to the future, one can, of course, see possibilities, but I believe that we are at a crisis which demands the whole-hearted, collective and individual support of the profession in influencing these conditions, if we are to assure the efficiency, personnel and advancement of the future for which we look. This organization represents the leaders of the profession in North America, and it would seem that more consideration should be given to these problems in our meetings. They are frequently discussed by individuals and are no doubt in the minds of many during these times of general business depression, but they are not discussed nor acted upon by official organizations. With increased responsibility, greater demands for efficiency and an ever-broadening field of professional activity it is a part of this organization's duty to pledge its influence in having this advancement met at least part way by the public. We can not be indifferent to existing conditions and tendencies. Some of them are not pleasant nor exactly inspiring, but therein rests our duty.

There is little need of speaking of loyalty to a gathering of this kind. I wish to offer a few thoughts, however, regarding its significance in influencing the future of veterinary medicine. The prospective student, or possibly his parent, before deciding upon a professional calling usually seeks the advice and opinion of some member of the profession under consideration. It has been my experience to encounter many veterinarians who do not hesitate to state that any farmer or other individual who might ask their advice would be strongly advised against taking up the veterinary profession. With conditions as they are today the percentage of the profession which inclines this way is too great. Its influence on the future is, although we may hesitate to admit it, having a very strong influence on our schools and consequently on the future. Men holding official positions are much more inclined to advise young men to take up the veterinary profession than are practitioners, and in this respect there are wonderful possibilities before Federal and State officials. Their counsel is frequently sought, and their opportunities both in public and private for boosting the profession are many. Let each be a booster.

The few thoughts I have endeavored to bring out offer nothing

new, but it is hoped that they may serve as a stimulus to more consideration and action in connection with some of the problems which confront the profession and which are not going to be overcome by mere optimism and assurance of the future.

In conclusion, I wish to express my appreciation of the honor conferred upon me by the chairmanship of this section and of the cooperation and support which I have received during my term of office.

Your section officers have made an earnest endeavor to arrange a program in accordance with the wishes of those interested in this section. We have invited criticism of previous programs and suggestions for the present one. The majority have expressed the opinion that there should be more time for discussion and not as many papers as in previous years. As you will observe from the program, this has been carried out. We trust that the discussions will be both lively and beneficial, that all will enter into the spirit of the sessions and in so far as possible take part in the discussions.

REPORT OF SECRETARY OF SECTION ON SANITARY SCIENCE AND POLICE

CHAIRMAN JAKEMAN: The next will be the report of the secretary of the Section on Sanitary Science and Police.

(Dr. Hoskins read the following report:)

First, just a word to explain my presence here again as secretary of your section. Last year I declined reelection, not because I was unwilling to serve longer, but because I had held the office for three years and believed that a change might be of benefit to the section in particular and the Association in general. You elected Dr. B. T. Simms of Oregon to succeed me. During the year it became necessary for Dr. Simms to resign, owing to his inability to serve the section as secretary. At the urgent solicitation of your chairman, President White appointed me to fill out the unexpired term of Dr. Simms.

You may be impressed with the small number of papers on our program. This is largely intentional. We have been more or less severely criticized in previous years for our programs being overloaded. This was not entirely within the control of the section officers, however. The heavy program materially shortened the time available for discussion, and this was the greatest objection. We hope that full advantage will be taken of the time available for discussion of the papers presented this year.

Attention should be directed to the reorganization of the section work this year. The old Section of College Faculties and Examining Boards now becomes the Section on Education and Research. So far as our section is concerned, this realignment has had the effect of taking from this section a large number of papers that would ordinarily have been given in this section under the former arrangement. The effect of this reorganization of the section work may be seen in the program this year. Whether it is satisfactory to the majority of the members rests with the members themselves. We see what the possibilities are, in the case of such a subject as infectious abortion. We have this subject being presented, in various phases, in each of the three sections. Your secretary believes that the present arrangement is probably the best that we have had so far, and that many of the present unsatisfactory features may be largely eliminated by closer cooperation of the section officers in the matter of building up the programs for the section meetings.

H. PRESTON HOSKINS, *Secretary.*

PRESENTATION OF PAPER

CHAIRMAN JAKEMAN: Next will be a paper by Dr. Munce on "The Importance of Preventive Measures in Controlling Animal Diseases."

(Dr. T. E. Munce read his paper, which appeared in the January, 1922, issue of THE JOURNAL.)

ELECTION OF OFFICERS

CHAIRMAN JAKEMAN: We have one more paper to come before this section which does not appear on the program, but Dr. White has stated that there will be some time available at tomorrow's session. We still have the election of officers for this section, and I think we had better proceed to that at this time. Nominations for chairman of this section are in order.

DR. KIERNAN: I nominate R. C. Reed, of Maryland.

DR. EICHHORN: Dr. Fitch, of Minnesota, has been nominated.

(Moved that the nominations be closed; seconded and carried. A ballot was taken, in which Dr. Fitch received 11 votes and Dr. Reed 4. Dr. Fitch was declared elected chairman of the Section on Sanitary Science and Police.)

CHAIRMAN JAKEMAN: Nominations for secretary are in order.

DR. REED: I would like to place in nomination Dr. Preston Hoskins of Detroit.

(It was moved, and seconded and carried that the nominations be closed and the ballot cast for Dr. Hoskins, who was declared elected as secretary of the section.)

Adjournment.

THURSDAY MORNING, SEPTEMBER 8, 1921

SECTION ON GENERAL PRACTICE

The meeting convened at 10 o'clock a. m., Dr. T. H. Ferguson presiding.

CHAIRMAN'S REMARKS

CHAIRMAN FERGUSON: This section ought to be the strongest section of the A. V. M. A. There are more practitioners members of this Association than any other class of men. We have it over the other sections in numbers, and there is no reason why this section should not be the dominating force of this Association. In fact, it ought to be that way. The practitioners ought to dominate the A. V. M. A. The reason they haven't done so has been to some extent influenced by the location of the meetings. At meetings that are held in the extreme West or the extreme East, we don't get a large attendance of practitioners, and the other men are regular attendants at the meetings. They are always here and naturally they run the A. V. M. A. They are the men that dominate and run it.

The other sections are important to the practitioner. The

Section on Sanitary Science and Police is very important to the practitioner, and the Section on Veterinary Colleges and Examining Boards is very important. The practitioner should be well posted on both of those sections, but he can get most of the papers from those sections and most of their work through the proceedings. He can keep in close touch with the work of those sections through the proceedings. At the meetings he should give his undivided attention to his section, the Section on General Practice, and the Section on General Practice is just what we make it. There is no chairman or other officer of the section that can make it a good section without your hearty cooperation.

In getting together this program, personally (and I think the Secretary also) I had a great deal of difficulty. In fact, the members were perfectly willing to prepare papers in case they could attend the meeting. They were very anxious to help things along, but they could not attend for business reasons.

PRESENTATION OF PAPERS

CHAIRMAN FERGUSON: We will take up the first paper, which is "Parturient Paresis," by Dr. A. A. Motley, Alpena, Michigan. Dr. Motley is not present, but he sent me the paper.

(It was voted, on motion, duly seconded, that the paper be read.)

(Secretary Muldoon read the paper of Dr. Motley, which was published in THE JOURNAL for October, 1921, page 63. The discussion following the paper was published in THE JOURNAL for November, 1921, page 200.)

CHAIRMAN FERGUSON: We will pass to the next paper, "The Veterinarian and the Public," by Dr. A. N. Carroll of Pueblo, Colorado.

(Dr. Carroll read his paper, which appeared in THE JOURNAL for December, 1921, page 315.)

(Dr. William Stephenson of Salt Lake City, who was on the program for a paper on "Coordination and Cooperation of State Sanitary Officials," was not present, neither was Dr. J. F. DeVine, who had the next paper on "Diagnosis of Pregnancy in the Bovine," nor Capt. R. A. Kelser, who was on the program for a paper on "Gangrenous Dermatitis of the Horse.")

CHAIRMAN FERGUSON: We will pass on to the next paper, "Field Observations on Loco Poisoning," by Dr. O. E. Troy, Raton, New Mexico.

(Dr. Troy read his paper, which was published in THE JOURNAL for December, 1921, page 299.)

CHAIRMAN FERGUSON: You have heard Dr. Troy's paper and his recommendation. Is there any discussion?

DR. GLOVER: The Colorado Agricultural College, in cooperation with the United States Department of Agriculture, adopted

a four-year investigation of so-called loco weed, with headquarters at Hugo, Colorado. During this time the plants representing the different species were sent to Washington for analysis, and subsequently a bulletin was issued from Washington to the effect that barium was considered probably the poison in the plant that caused the trouble. Subsequently a bulletin was issued from Washington to the effect that barium was found in equal quantities in alfalfa and that there was nothing to the barium theory. I do not believe that anyone maintains nowadays that barium is the cause of loco-weed poisoning. In fact, the poison has never been found, and I want to say that my personal opinion is that loco-weed disease should be classified with the deficiencies. Now, the animals never eat loco weed except when the grass is very short and they are getting hungry. The loco weeds are bulky and they have a very filling and very satisfying effect, with the result that the animals eat exclusively loco weed and starve to death while they are doing it.

The symptoms do not simulate any other kind of poisoning or infection that we know of. It is more like starvation. My opinion is that it will yet be revealed that it is really a deficiency disease. There is something lacking in the weed; at any rate something that fails to put nutrition in the animal. At the present time I am working from that standpoint. I may be wrong, but I think I am not.

DR. PATERSON: In answer to my old professor, I am thoroughly convinced he is wrong. (Laughter.) I have seen horses badly locoed, and after having been taken off for months and sometimes years, and then turned into a pasture and allowed to eat loco weed for one or two weeks, they would be as crazy as a bedbug. I know one horse that was off for three years, was broken and as fat as could be, and after going back to loco weed has died. It is in the fall that they are most likely to contract the disease. They contract it early in the fall and winter when the grass is short.

CHAIRMAN FERGUSON: Is there any further discussion on this very interesting paper? If not, do you wish to do anything with the Doctor's recommendation?

(It was voted, on motion of Dr. Glover, duly seconded, that Dr. Troy's recommendation regarding gathering available data on this subject be adopted.)

CHAIRMAN FERGUSON: We are unable to get the lantern. I presume that we shall have to dispense with Dr. Kingman's illustrated lecture on "Clinical Cases." I presume he will be unable to go on with it without the lantern. I am very sorry, because I am sure it would be of great interest to us.

The next paper is "Clinical Aids in the Differential Diagnosis of Common Poultry Diseases," by R. H. Beaudette. He

has sent his paper in, and if there is no objection, it will be read by title and printed in THE JOURNAL.

(Dr. Beaudette's paper was published in THE JOURNAL for December, 1921, page 283.)

CHAIRMAN FERGUSON: The next paper is "Digestive Diseases of the Dog and Cat," by Dr. F. H. McNair, Berkeley, California. He is not present.

(Dr. McNair's paper appeared in THE JOURNAL for November, 1921, page 170.)

DR. KINGMAN: I make a motion that we adjourn. (Seconded.)

CHAIRMAN FERGUSON: It has been moved and seconded that we close the program and proceed with the election of officers.

DR. COTTON: It seems to me that that wouldn't be the thing to do. Dr. Kingman says he can present his paper in ten minutes. We all came a good way to hear this paper, and I think that out of courtesy to him we should hear this paper. I would like to give him ten minutes. I would like to amend that motion, that we hear Dr. Kingman's paper. (Seconded.)

(Dr. Kingman withdrew his motion to adjourn, and the motion of Dr. Cotton, that Dr. Kingman's paper be heard, was carried.)

(Dr. Kingman presented his paper, giving demonstrations of the methods of suturing. His paper appeared in THE JOURNAL for November, 1921, page 165.)

ELECTION OF OFFICERS

CHAIRMAN FERGUSON: Nominations for chairman of this section are now in order.

DR. JACOB: I nominate Dr. Muldoon for chairman.

(The nomination was seconded by Dr. Kron.)

(It was voted, on motion of Dr. Moye, duly seconded, that the nominations be closed, and that the Secretary be instructed to cast the unanimous ballot of the Association for Dr. Muldoon. The secretary cast the ballot for Dr. Muldoon and he was declared elected.)

CHAIRMAN FERGUSON: Nominations for secretary are now in order.

DR. CARR: I nominate Dr. Kingman as secretary of this section.

(The nomination was seconded by Dr. Troy.)

DR. HUTHMAN: I move that the rules be suspended and that the secretary cast the unanimous ballot of the Association for Dr. Kingman.

(Dr. Huthman's motion was seconded and carried, and Dr. Kingman was declared elected.)

Adjournment.

THURSDAY MORNING, SEPTEMBER 8, 1921

SECTION ON VETERINARY COLLEGES AND EXAMINING BOARDS

The meeting was called to order at 9:30 a. m. by Secretary Goss in the absence of Chairman Chamberlain. Dr. W. W. Dimock was elected temporary chaiman and took the chair.

DR. FITCH: Do we not have to go back to the program of Tuesday? Tuesday's program was not heard.

CHAIRMAN DIMOCK: Do you care to make that as a motion, that we go back.

DR. FITCH: I would like to inquire before I make the motion as to how many of the authors of the papers are here. Are Drs. Boerner or Stubbs here?

SECRETARY GOSS: Dr. Chamberlain, of course, is not here for his address. Neither Dr. Stubbs nor Dr. Boerner is here. Their paper is presented.

PRESENTATION OF PAPERS

DR. FITCH: I move we proceed with the paper on "Studies in Swine Abortion," by Dr. Fred Hayes of California.

(Dr. Hayes's paper was printed in THE JOURNAL for January, 1922, page 435.)

CHAIRMAN DIMOCK: We will listen to the paper of Dr. Fred R. Jones on "The Types of *Bacillus bovisepticus* Encountered in a Dairy Herd."

(Dr. Jones's paper appeared in THE JOURNAL for December, 1921, page 271.)

CHAIRMAN DIMOCK: We have some more papers for this section and some business to attend to. We will go on with the program if that is the wish of the section. Let us put this to a vote, what you will do. I understand there will be no other opportunity for this section to meet. I think we ought to dispose of these matters.

DR. MOORE: I move that this section meet after the general section.

(The motion was duly seconded and carried.)

Adjournment.

(The Executive Board has ruled that owing to the failure of this section to elect officers at a regular session, the officials of last year will be continued in office for the current year. Therefore F. W. Chamberlain is chairman and L. W. Goss secretary of the Section on Education and Research.)

FRIDAY MORNING, SEPTEMBER 9, 1921

SECTION ON SANITARY SCIENCE AND POLICE

The meeting convened at 9:45 a. m., Dr. Jakeman presiding.

CHAIRMAN JAKEMAN: This is a special meeting for the election of officers for the section.

DR. HOSKINS: Before we come to the election of officers, I want to read the resignation of Dr. Fitch. "I desire hereby to extend my resignation as chairman of the Section on Sanitary Science and Police of the American Veterinary Medical Association. (Signed) C. P. Fitch." I move that his resignation be accepted.

(The motion was seconded by Dr. Kiernan and carried.)

CHAIRMAN JAKEMAN: Nominations for chairman to substitute for Dr. Fitch are now in order.

(On motion of Dr. Eichhorn, duly seconded, Dr. R. C. Reed was elected as chairman of the Section on Sanitary Science and Police.)

Adjournment.

RESIDENT SECRETARIES FOR 1921-1922

Alabama, D. J. Meador, Selma, Ala.
Alaska, S. Hadwen, Reindeer Investigations, Unakleet.
Alberta, J. C. Hargrave, Dominion Vet. Inst., Medicine Hat.
Arizona, R. J. Hight, Tempe.
Arkansas, J. H. Bux, Old State House, Little Rock.
British Columbia, J. W. Frank, 119 Pender St., W. Vancouver.
California, J. F. McKenna, 616 Eye St., Fresno.
Colorado, I. E. Newsom, Fort Collins.
Connecticut, A. T. Gilyard, 74 Phoenix Ave., Waterbury.
Cuba, B. Crespo, No. 20 Avenida De Italia, Havana.
District of Columbia, T. P. White, 1348 Kenyon Street, Washington.
Florida, M. Schofield, Miami.
Georgia, A. A. G. Richardson, 1234 Lumpkin St., Athens.
Hawaii, H. B. Elliott, Box 187, Hilo.
Idaho, J. D. Adams, 417 Union St., Boise.
Illinois, W. H. Welch, Lexington.
Indiana, W. B. Craig, 216 N. Meridian Ave., Indianapolis.
Iowa, K. W. Stouder, 226 Russell Ave., Ames.
Kansas, W. E. Muldoon, Vet. Div., K. S. A. C., Manhattan.
Kentucky, C. W. Fisher, 117 S. 4th St., Danville.
Louisiana, E. P. Flower, Box 24, Baton Rouge.
Maine, J. B. Reidy, State Capitol, Augusta.
Manitoba, J. B. Still, Boyd Bldg., Portage Ave., Winnipeg.
Maryland, G. H. Grapp, 2825 Clifton Ave., Baltimore.
Massachusetts, T. E. Maloney, Box 413, Fall River.

Mexico, Luis Santa Maria, P. O. Box 44, Piedras, Negras, Coah.
Michigan, B. J. Killham, Old State House, Lansing.
Minnesota, D. B. Palmer, 1054 S. E. 14th St., Minneapolis.
Mississippi, O. N. Norton, 109 Main St., Greenville.
Missouri, F. M. Cahill, 9th and Mary Sts., St. Joseph.
Montana, A. D. Knowles, 302 South 4th St., W. Missoula.
Nebraska, W. T. Spencer, State Capitol Bldg., Lincoln.
Nevada, S. Lockett, Univ. of Nevada, Reno.
New Brunswick, D. McCruaig, McAdam Junction.
New Hampshire, F. F. Russell, 17 Dartmouth St., Concord.
New Jersey, P. F. Runyon, 41 E. Main St., Freehold.
New Mexico, O. E. Troy, Raton.
New York, L. J. Tompkins, Hobart.
North Carolina, J. B. Spoon, 317 Worth St., Burlington.
North Dakota, W. F. Crewe, Bismarck.
Nova Scotia, J. Steen, Bellevue, Spring Garden Road, Halifax.
Ohio, C. H. Case, 50 E. Buchtel Ave., Akron.
Oklahoma, C. H. Anthony, 2 E. 4th St., Oklahoma City.
Ontario, J. A. Campbell, 8 Edward St., Toronto.
Oregon, B. T. Simms, Oregon Agri. College, Corvallis.
Pennsylvania, S. G. Hendren, 11 E. Market St., Lewistown.
Philippine Islands, S. Youngberg, Bu. of Agri., Manila.
Prince Edward Island, C. J. Bonsfield, 120 Upper Prince St., Charlottetown.
Quebec, J. O. Langevin, 51 McGill St., Montreal.
Saskatchewan, M. Barker, P. O. Bldg., Regina.
South America, E. P. Stirling, Paysandu, Uruguay.
South Carolina, W. K. Lewis, 901 Nat'l Bk. Bldg., Columbia.
South Dakota, G. S. Weaver, Brookings.
Tennessee, E. I. Smith, 405 7th Ave., N. Nashville.
Texas, F. E. Barnes, Waxahackie.
Utah, W. A. Stevenson, 308 State Capitol, Salt Lake City.
Vermont, A. J. De Fossett, Montpelier.
Virginia, T. Fraser, 316 N. Henry St., Richmond.
Washington, P. MacKintosh, 214 S. 2nd St., Yakima.
West Virginia, J. J. Cranwell, 816 4th St., Fairmont.
Wisconsin, T. H. Ferguson, 421 Broad St., Lake Geneva.
Wyoming, B. F. Davis, P. O. Box 355, Cheyenne.

President Kinsley has appointed Dr. W. H. Welch, Lexington, Ill., as resident secretary for Illinois in place of Dr. L. A. Merillat, who resigned that position.

President Kinsley has appointed Dr. W. H. Wray of Beaconsfield, England, resident secretary for the British Isles for the current year.

THE ST. LOUIS CONVENTION

President Kinsley and Secretary Mayo met Mr. Hatfield, representing the St. Louis Tourist and Convention Bureau, in St. Louis on the 19th of December, and, together with local veterinarians representing St. Louis and East St. Louis, plans were made for the 1922 convention of the A. V. M. A.

An investigation was made of the hotels, and the Planters' Hotel was selected as headquarters for the Association. The general sessions and sectional meetings will be held at the Planters' Hotel.

On Wednesday and Thursday it is planned to hold clinics at the National Stock Yards in East St. Louis, and arrangements are being made to have one of the best arranged and most interesting clinics ever held. On Tuesday evening, August 29, there will be a smoker and round table at the Planters' Hotel. The personnel of the local committees will be supplied next month.

An excellent and enthusiastic organization has been perfected in St. Louis for making this the largest and most practical meeting that the Association has ever held. N. S. MAYO.

A. V. M. A. SPECIAL COMMITTEE

President Kinsley has appointed a special committee of the A. V. M. A., consisting of Dr. J. H. McLeod, chairman, Dr. Charles E. Cotton and Dr. L. A. Merillat, to consider plans for a closer affiliation between the A. V. M. A. and State and local veterinary organizations.

PHILADELPHIA VETERINARY CLUB

The Philadelphia Veterinary Club held its regular monthly meeting, Friday evening, December 30, 1921, at the Veterinary School, Philadelphia, Pa.

Dr. Allen J. Smith of the Medical Department, University of Pennsylvania, addressed the Laboratory Section in conjunction with the Veterinary Club, regarding the need for more laboratories for the use of the veterinarians.

Dr. Harry E. Bender of Lititz, Pa., gave a talk on "The Need for Veterinary Service in Our Stock-breeding Sections."

Both subjects were very interesting and were thoroughly discussed by the members present.

The Pennsylvania State Board of Veterinary Medical Examiners and Registrars was in session and attended our club meeting.

We had in attendance sixty-one.

C. S. ROCKWELL, *Secretary.*

OKLAHOMA VETERINARY MEDICAL ASSOCIATION

The semi-annual meeting of the Oklahoma State Veterinary Medical Association was held in Oklahoma City, January 4 and 5, and the following papers and discussions were participated in:

"Opportunities of Veterinarians in Poultry Practice in Oklahoma," by Dr. C. L. Nelson; "Production of Certified Milk," by Dr. C. H. McElroy; "Normal Temperature of Animals," by Dr. L. L. Lewis; "Report on the National Progress of Tuberculosis Eradication," by Dr. Elmer Lash; "Diseases of Hogs in Oklahoma," by Dr. C. H. Fauks.

Dr. H. Jensen conducted a very spirited round table talk and Dr. A. T. Kinsley led a very spirited and instructive discussion on the diseases of hogs. On the evening of January 4 a very enjoyable banquet was attended by all veterinarians, wives and friends, at which time a discussion of a proposed veterinary college to be established at the A. and M. College of Oklahoma was held. The meeting was attended by about fifty veterinarians, with several visitors from adjoining states.

T. O. BOOTH, *Secretary.*

ALABAMA VETERINARY MEDICAL ASSOCIATION

The next annual meeting of the Alabama Veterinary Medical Association will be held at Auburn, Alabama, on February 23, 24 and 25. On the 25th an examination will be given to licensed veterinarians for testing accredited herds. It is hoped that at least two of the new veterinary buildings in the Alabama Veterinary Medical College will have been completed by that time.

C. A. CARY, *Secretary.*

CONFERENCE OF VETERINARIANS AT PENNSYLVANIA

A conference of veterinarians will be held at the University of Pennsylvania Veterinary School on February 28 and March 1. The present status of vaccines for abortion disease of bovines, diagnosis of pregnancy and treatment of sterility in the cow, hog cholera and other infectious diseases of swine, treatment of udder diseases, and other topics relating to cattle and swine will be discussed by veterinarians who are especially qualified to speak on these subjects. All veterinarians are invited. No fees will be charged. A copy of the program will be mailed on request.

INVITATION TO BRITISH MEETING

Dr. J. Basil Buxton, General Secretary of the National Veterinary Medical Association of Great Britain and Ireland, upon instruction by the Council of that Association, extends a cordial invitation to any members of the American Veterinary Medical Association who may happen to be in England to attend the meeting of the National Veterinary Medical Association of Great Britain and Ireland, which will be held at Bath from August 1 to 4, 1922.

It is hoped that any members of the A. V. M. A. who may be in Europe will try and make arrangements so that they can attend this meeting.

SOUTH DAKOTA LABORATORY SERVICE

Diseased specimens, including samples of blood and parts of diseased animals and fowls, are being received at the rate of 25 to 40 each week at the Animal Health Laboratory, State College, Brooking, S. D. These specimens come from farmers, veterinarians, county agents and other parties in all parts of the State for examination work and diagnosis. The work is carried on by Dr. C. C. Lipp and his assistants.

The aim of the laboratory force is to make the examination on the day of receipt of the specimen, so far as possible. The work is growing to such an extent, however, as to tax the capacity of the plant.

NECROLOGY

Dr. George B. Jobson died at his home in Franklin, Pa., December 16, 1921, after an illness of several years. He was born in Edinburgh, Scotland, December, 1839, received his early education at Hawick, Scotland, studied law and later became a wholesale coal merchant. He and his wife, who still survives him, came to America in 1869 and engaged in farming near Lynchburg, Va. Later he was farm superintendent for the McDonough Institute for Boys, near Baltimore. From there he was called to a similar position near Poughkeepsie, N. Y. In 1880 he came to Franklin, Pa., as superintendent of the Miller & Sibley Stock Farm, which position he filled faithfully and well for thirteen years. During his incumbency at this place one of the best herds of Jersey cattle in America was developed.

He was always active in civic, local and State affairs. He was mayor of Franklin in 1897 and served for a number of years on city council. He assisted greatly in organizing the State Livestock Sanitary Board of Pennsylvania, was one of the original twelve men selected to enforce the new meat inspection law and was always helpful in enforcing the laws and regulations of the Board. Dr. Jobson was one of the most respected members of the veterinary profession in the State. He seldom missed a meeting of livestock breeders or veterinarians. He was a good writer and a fluent speaker and contributed much toward the upbuilding of the veterinary profession and of a better system of animal husbandry in the State.

He was of the good old Scotch Presbyterian type of man, with many friends and but few enemies. He helped organize the Sunday school which later developed into the Rock Grove Presbyterian Church, was an active member of the First Presbyterian Church of Franklin, of Myrtle Lodge, F. and A. M., and a member and ex-president of the State Veterinary Medical Association.

He is survived by his widow, three sons, three daughters and ten grandchildren. C. J. M.

Dr. Charles Barnwell Robinson died suddenly at his residence on December 19 in his 62d year, after 33 years of practice as a

veterinary surgeon in the District of Columbia. Dr. Robinson's death was a severe shock to his many friends. He arrived at home about 5 o'clock in the evening and while sitting at his desk told one of his children that he never felt better. A few minutes later he was found dead. An attack of heart trouble is believed to have been the cause of his death. Dr. Robinson was born at St. Thomas, Canada, July 26, 1859, the son of Jabel and Carolina Robinson. His father was at one time a member of the Canadian Parliament.

Dr. Robinson was a graduate of the Ontario Agricultural College and the McGill Veterinary College in the class of 1882. Upon coming to the United States he first settled in Wheeling, W. Va., but went to Washington, D. C., in 1888. In 1894 he founded the United States College of Veterinary Surgeons in the Capital City. He was elected president of the board of directors of that institution, which position he held at the time of his death. He is survived by his widow, three children, Mrs. Carrie R. Smith, and Charles J. and Joseph Robinson.

Dr. J. A. H. Winsloe, of Cooperstown, North Dakota, died on November 22, 1921.

Dr. Winsloe had been Assistant State Veterinarian of North Dakota. He was a graduate of the Ontario Veterinary College in the year 1897 and joined the A. V. M. A. in 1911.

Dr. Willard L. Linn of Holcomb, Illinois, died November 24. Dr. Linn was a graduate of the Chicago Veterinary College in 1890. He joined the A. V. M. A. in 1920. He was also a member of the Illinois Veterinary Association, and had held the position as Assistant State Veterinarian of Illinois. The wife and daughter survive him.

The JOURNAL regrets to report the death of the wife of Dr. N. Rectenwald, the oldest practicing veterinarian in Pittsburgh, and the mother of Dr. John Rectenwald, a prominent physician of Pittsburgh, Pa. Dr. John Rectenwald graduated in veterinary medicine at the University of Pennsylvania in 1894 and later completed his course in human medicine.

MISCELLANEOUS

GENERAL WOOD AND HIS FIGHT AGAINST YELLOW FEVER

On December 12, 1899, the War Department made General Leonard Wood Governor of Cuba, and at the same time it sent Major Walter Reed to investigate yellow fever in Cuba. The conjunction occurred, and one of the greatest of human events resulted. The curse of yellow fever was blotted from the earth; millions of future lives were insured an existence; great tracts of the world were made potentially habitable; commerce was stimulated; hope was created; and fears of an invisible foe were laid to eternal rest—all because two great minds met at the appointed time and place. Walter Reed could not have triumphed without Leonard Wood and Wood could not alone have rid Cuba of yellow fever.

This last statement does not detract from the greatest of either Wood or Reed. Wood is great because he was a great executive. Reed is great because he was a great producing scientist.

It is a mistake to say that General Wood's medical education made it possible for him to rid Cuba of yellow fever. Had General Wood, the executive, attempted to force his will upon Reed, the scientist, he would have proven thereby that he was a poor executive, and would have effectually prevented Reed from demonstrating that he was a great scientist. The temptation of Wood to "meddle" with Reed must have been great, and it is a valuable index of his real executive ability that he never side-tracked from his own big functions.

A big executive is a man who can assume big responsibilities, and distribute them on the shoulders of others capable of accomplishing productive results. When an executive destroys the initiative of his agents by personal interference he ceases to be big. Wood was never an executive of this kind.

In 1899, yellow fever was as terrible a mystery as the witches and warlocks of the last century. It was no respector of persons, and it upset all the rules of quarantine and disinfection. Dr. Finley of Cuba had guessed its secrets, but he had no proof to back his claim that a certain variety of mosquito was in some way associated with the disease. Reed attempted to furnish the proof, because the correctness of Finley's observations

appeared plausible. His plans were presented to Governor Wood for approval, and funds were requisitioned. The Governor was asked by Major Reed to take the responsibility for large expenditures of money, for possible losses of life during experimental investigation, for a possible uprising among the natives, and for a step which would, in all probability, cause an upheaval at home among that class of people who bite and claw at any official who countenances an unusual undertaking.

Wood had the vision to see the possibilities presented by Reed, and with the vision to comprehend, he also had the courage to commit himself to action. The story of Reed has been told in many books, but the chronicles are silent about the bigness of Governor Wood who assumed the entire responsibility for Walter Reed's work. Fortunately the experiments were conclusive, and an astonished world had no chance to start an opposition before the big fact was known—that yellow fever was to be conquered.

Having found the cause of yellow fever, it was typical of General Wood that he lost no time in removing it. Major Reed's health was broken, and he returned to the United States to leave General Gorgas the chosen agent to make use of the knowledge that Reed had given. The Department of Public Health in Havana was at that time a rather impotent organization. The police, street-cleaning, and other departments all "ranked" it. Governor Wood changed all of this by making the Department of Health almost omnipotent. If friction developed between the Health and other departments, he solved the difficulty by giving Health the right of way. No department of health in the world's history ever possessed such power, and probably never again will health be a governor's first consideration. Here, again, Wood's breadth of vision came to the rescue in concentrating on the big thing—even to the temporary neglect of unimportant routine matters that as a rule so fully occupy the time and strength of narrow-sightedness. Wood realized that the demonstration of the correctness of Reed's theories was the biggest question before the entire world at that time, and he saw to it that no petty interests should interfere with conclusive and final practical tests. Such qualities as have been ascribed to General Wood in this paper are not exceedingly rare. Why then do we say that it was the conjunction of Wood and Reed that made the elimination of yellow fever certain? Reed and Gorgas could have answered this question. President Roosevelt answered

it when he said "Good executives are rare, but good, honest leaders are very rare. Both make great men. But when a man is a great leader and a great executive as well, he becomes a superman. Such a man is Leonard Wood."—*Abs. from The Alumni Register, University of Pennsylvania, vol.* 24 (1921), *No.* 2, *p.* 90, *by Col. Henry Page, U. S. A., retired.*

GOVERNMENT SCIENTIFIC PERIODICALS SUSPENDED

"A group of the most important scientific periodicals in America have suspended publication. Uncle Sam is the publisher. The Department of Agriculture is editor. Uncle Sam, through his Congress, said not long ago: 'Quit publishing all periodicals on December 1 unless I tell you in each case specifically to continue.' Then Congress adjourned without giving anyone or any committee authority to determine which periodicals should keep on appearing. As a result some forty-one publications issued by the Government departments have suspended publication, in most cases without even the customary obituary notice. From a scientific standpoint, of those that are suspended, four Department of Agriculture publications are the most important—*The Experiment Station Record, The Journal of Agricultural Research, Meteorology, Public Roads.* Four other Department of Agriculture periodicals were doing a real service. *The Weekly News Letter,* circulation 126,000, kept the 106,000 collaborators and employees of the department in touch with its activities and served to take current information to those especially interested in agriculture. By suspending the forty-one Government periodicals, it has been estimated that from $500,000 to $1,000,000 will be saved each year. This is false and mistaken economy, so far as science is concerned. Science or research of any kind that is allowed to rest in the notebooks of the researcher will not travel very far. Only when scientific facts are sown broadcast on the printed page, only when they reach the fertile minds of other scientists, will they eventually bring about the maximum of improvements in methods and culture that allow the farmer to grow more and better crops and livestock. It is not inconceivable that the suspension of the quartet of periodicals mentioned will cause a much greater loss to the country than the supposed saving on all forty-one periodicals."—*Washington Herald.*